

## 2.0 Reducing Carbon Emissions That Contribute to Climate Change

Carbon emissions generated in Santa Barbara contribute to the cumulative emissions worldwide that are causing accelerated climate change. Reducing the amount of these emissions in Santa Barbara, together with communities across the world, is intended to lessen the extent of future climate change and severity of its impacts.

This section describes present and planned City efforts in the Santa Barbara community and City government operations that would reduce the level of carbon emissions, especially from ongoing activities involving oil and gas combustion for electricity and travel fuel. Information presented includes:

- 2.1 *Emission Reduction Targets:* Citywide carbon emission reduction targets for the years 2020 and 2030, for total annual emissions and per capita annual vehicle emissions.
- 2.2 *Emission Inventories and Forecasts:* Carbon emissions generation from Santa Barbara (citywide and City government operations) are estimated for past years (1990 and 2005), baseline year (2007), and present (2010). Citywide emissions are forecasted for future years 2020 and 2030 without the Climate Plan strategies (“Without Plan”).
- 2.3 *Emission Reduction Strategies:* Describes current measures in place and planned future actions to reduce carbon emissions.
- 2.4 *Effectiveness of Strategies:* Identifies estimated future carbon emission reductions associated with the Plan strategies, and comparison of a “With Plan” forecast to the emissions reduction targets.





## 2.1 Carbon Emissions Targets

This section describes future citywide carbon emissions targets for the city of Santa Barbara.

### 2.1.1 Policy guidance for carbon emissions targets

#### International carbon emissions targets

The Kyoto Protocol (signed at 1997 United Nations Framework Convention on Climate Change, effective 2005) is an agreement establishing targets for participating developed countries to reduce carbon emissions by an average of 5% percent below 1990 levels by 2012. The United States is not a party to the Kyoto Protocol.

However, the U.S. Mayors 2005 Climate Protection Agreement directed cities to work towards meeting or exceeding the Kyoto targets in their communities and government operations (referencing 7% below 1990 levels by 2012). This Agreement was endorsed by the mayors of 1054 U.S. cities, including Santa Barbara.

#### Federal carbon emissions targets

There are presently no overall federal legislative policy goals or plan for national carbon emissions reduction. In connection with pending 2009 legislation by Congress and discussions prior to the Copenhagen international climate change summit, the Administration proposed a goal of carbon emission reductions of 17% below 2005 levels by 2020, however this idea has not been established as a national policy goal.

The President's Executive Order 13514 in 2009 does require federal departments to establish emission reduction goals, and the Environmental Protection Agency is promulgating regulations for stationary sources under Clean Air Act provisions. Federal vehicle regulations require doubling of average gas mileage to 54.5 miles per gallons by 2025 for new cars and trucks sold.

#### California carbon emissions targets

California emits about 2% of worldwide carbon emissions. The Governor's Executive Order S-3-50 and Assembly Bill (AB) 32, the Global Warming Solutions Act, establish a California target for *reduction of annual statewide carbon emissions generation to 1990 levels by the year 2020.*

The California Air Resources Board (CARB) Climate Change Scoping Plan (2008) quantified the 2020 statewide target as 427 million metric tons of carbon dioxide equivalent (MMTCO<sub>2</sub>e), about a 15% reduction.

The CARB Scoping Plan recommends that local agencies also pursue a 2020 target to reduce carbon emissions to 1990 levels within their jurisdictions, generally about 15% less than baseline levels in the period of 2005 – 2008.

### Regional County carbon emissions targets

The California Legislature enacted Senate Bill (SB) 375, the Sustainable Communities and Climate Protection Act of 2008, with the intent of reducing the portion of greenhouse gas emissions resulting from passenger vehicle travel by establishing a process to integrate land use and transportation planning.

The legislation requires each of the State's Metropolitan Planning Organizations (MPOs) to prepare a regional sustainable communities strategy with coordinated policies for land use development and transportation to reduce carbon emissions from passenger vehicles. The Santa Barbara County Association of Governments (SBCAG) has begun a process to develop a sustainable community strategy for the Santa Barbara County region.

SB 375 directed the California Air Resources Board (CARB) to provide each MPO region with greenhouse gas emission reduction targets (regional targets) for the automobile and light truck sector for the years 2020 and 2035. The focus for statewide reductions was identified as large metropolitan areas that are responsible for the majority of the State's vehicle carbon emissions. In September 2010, CARB and SBCAG established regional targets for Santa Barbara County of *zero increase in per capita vehicle emissions from 2005 levels in the years 2020 and 2035*.

#### 2.1.2 Santa Barbara carbon emissions targets

The Santa Barbara community carbon emissions targets for the years 2020 and 2030 correlate with City General Plan policies directing greater sustainability and climate protection measures. The targets are consistent with the established State and regional emissions targets discussed above. Emissions are considered in metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e).

<b>Figure 2-1 Citywide Annual Carbon Emissions Targets for 2020 and 2030</b> (metric tons carbon dioxide equivalents MTCO <sub>2</sub> e)	
Total annual citywide carbon emissions (year 2020 target):	1990 level of total annual citywide carbon emissions, per the State AB 32 target. [estimated at <u>724,389 MTCO<sub>2</sub>e</u> ]
Annual per capita vehicle carbon emissions (year 2020 and 2030 target):	2005 level of annual per capita carbon emissions from passenger vehicle and light truck travel, per the SB 375 State and regional County target. [estimated at <u>4.413 MTCO<sub>2</sub>e/person</u> ].

*[Note: This City climate plan has a planning horizon to 2030. The 2030 City vehicle emissions target is a proxy for the regional 2035 target.]*

### 2.1.3 Longer-range emissions reduction planning

The general goal and expectation of ongoing State and local planning for climate change is to continue to reduce carbon emissions past the year 2030 and through to the end of the century. Governor Swartzenagger's Executive Order S-3-50 had identified a general goal of statewide annual emissions reduction to 80% below 1990 levels by the year 2050. President Obama's 2009 proposal identified a goal of 83% reductions by 2050. Such longer-range goals have not yet been incorporated into legislative measures applicable to local jurisdictions.

Forecasting carbon emissions generation further into the future beyond 2030 becomes more problematic and speculative, as key variables affecting the forecasts cannot be predicted that far in advance. For example, there may be many technological changes by 2050 that could change emissions generation rates, such as those pertaining to alternative vehicles and fuels, renewable energy, and post-combustion carbon capture for power generation. There could be future legislative actions providing additional incentives or regulations that could greatly affect statewide energy consumption or travel emissions from particular sectors or all sectors. Future changes in the overall economy, and specific economic factors such as market prices for energy also have substantial effects on emissions rates. As such, there is a broad range of possible assumptions that could be employed in forecasting, resulting in a wide range of potential future emissions levels and a large margin of error.

Similarly, it is problematic to attempt identifying action programs to be implemented that far into the future. Conditions in those future times cannot be reasonably predicted, so the feasibility and effects of future measures cannot be reasonably assessed without substantial speculation.

This climate plan has a planning horizon to the year 2030, with the expectation of future plan updates based on initial plan implementation and monitoring of emissions levels. Emissions targets for longer-range periods and any additional future carbon emissions reduction programs will be revisited in subsequent plan updates.



## 2.2 Carbon Emissions Inventories and Forecasts

In this section, estimated past, present, and forecasted future levels of annual carbon emissions generated by the Santa Barbara community as a whole are presented.

A baseline year of 2007 is used for the carbon emissions inventories and projections. An update for 2010 is also provided to characterize current conditions. An emissions estimate for City government operations is also provided.

Estimates of past annual community carbon emissions levels in the years 1990 and 2005 are identified for the purpose of comparing forecasted future emissions with State and regional targets that use the lower emission levels of those past years.

Forecasted future citywide carbon emissions are estimated for Santa Barbara in the years 2020 and 2030 for carbon-generating activities involving electricity and natural gas use, travel and equipment fuels, and landfill methane emissions. The forecasts are based on estimated incremental future development under adopted City General Plan growth policies and use of the Santa Barbara traffic model developed for the recent General Plan update. The emissions forecasts also incorporate assumptions to account for recent State legislative actions that would reduce future carbon emissions across the State (e.g., renewable energy standard; vehicle emissions standards).

### 2.2.1 Methodology

#### Sources of carbon emissions

Greenhouse gases are identified as including carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O), as well as smaller contributions from hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (CA Health & Safety Code Section 38505(g))\* . As a shortcut, this document refers to “carbon emissions” or “greenhouse gas emissions”.

The large increase in atmospheric concentration of carbon dioxide in the period since the Industrial Revolution has been identified by scientists worldwide to be primarily due to cumulative combustion of fossil fuels such as oil and gas (e.g., for electricity production, travel fuels) and land use changes (e.g., deforestation, desertification, urban sprawl). Increases in methane and nitrous oxide are identified as primarily due to agricultural expansion and intensification, and methane is a gas bi-product from waste decay at landfills and wastewater treatment plants.

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\* Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>) are chemicals used in specialty industrial processes. These chemicals have high global warming potential but represent a small fraction of total greenhouse gas emissions. They are subject to federal regulation. HFCs and PFCs are used in low-temperature refrigerants, foam-blowing and fire suppression, plasma etching and cleaning solvents in semiconductor production, and aerosol propellants. Formerly in aerosol propellant use, SF<sub>6</sub> is used as a cover gas in magnesium production, casting dielectric gas and insulator in electric power equipment fire suppression, and as a discharge agent in military systems ([www.epa.gov/ozone](http://www.epa.gov/ozone)).

Sources of emissions included in the Santa Barbara estimates are on-road vehicle trip emissions; off-road vehicle and equipment emissions; natural gas and electricity consumption (Santa Barbara share of power generation emissions); Santa Barbara share of electricity use associated with State Water Project transport, and Santa Barbara share of landfill methane emissions.

Emissions are classified per the California Air Resources Board Scoping Plan as: Scope 1 emissions (direct CO<sub>2</sub> emissions released in Santa Barbara, such as from vehicle emissions and natural gas use); Scope 2 emissions (indirect emissions released outside of Santa Barbara, such as associated with electrical power generation and State Water Project water transport serving Santa Barbara power and water consumption); and Scope 3 emissions (miscellaneous emissions, including landfill methane releases).

### **Calculations of citywide carbon emissions inventories and forecasts**

Estimates for annual carbon dioxide and other greenhouse gas emissions generated citywide in Santa Barbara for the years analyzed were calculated using the computer software package Clean Air & Climate Protection (CACP, 2009).

The CACP computer software calculates the amount of carbon dioxide equivalent (CO<sub>2</sub>e) emissions in metric tons (MT) associated with the identified electricity, natural gas, vehicle and equipment fuel use, and methane gas generation.

Inventories and forecasts of citywide carbon emissions were initially prepared as part of the Program Environmental Impact Report (EIR) certified in September 2010 for the *Plan Santa Barbara* General Plan Update. The citywide inventories and forecasts provided for this climate plan represent a refinement of those initial inventories and forecasts. Emissions inventories for City government operations have also been calculated since 2005, and represent a subset of the citywide emissions inventories.

### **2.2.2 Past & present community carbon emissions generation (1990, 2005, 2007 baseline, 2010 estimates)**

The following describes calculation of past and present annual carbon emissions generation in the Santa Barbara community. Figure 2.1 provides emissions inventories for 1990, 2005, 2007, and 2010.

#### **Baseline carbon emissions inventory (2007)**

As part of the *Plan Santa Barbara* General Plan analysis, the year 2007 was selected as the baseline year for characterizing a community carbon emissions inventory because that was the most recent year with available comprehensive utility and travel data. The County of Santa Barbara, City of Goleta, and Santa Barbara County Association of Governments are also using 2007 as a baseline year, which will facilitate regional coordination on inventories and reduction programs on the South Coast and countywide.



The 2007 baseline inventory of carbon emissions generation in Santa Barbara was calculated by identifying estimated energy use (electricity and natural gas) for resident population and non-residential land uses (commercial, institutional, industrial, etc.). Numbers of residents and square footage of non-residential land uses were provided from census information and the City Planning Division's land use database. Information on electric and natural gas usage in 2007 was provided by utility companies.

Average numbers and lengths of vehicle trips for different land uses were obtained from information in the citywide traffic model for the *Plan Santa Barbara* General Plan update. In addition, the community's share of electricity used to transport State water, and landfill gas emissions associated with annual community solid waste disposal were calculated.

The 2007 inventory is a refinement to earlier work done in the General Plan Program Environmental Impact Report. The refinements reflect ongoing work statewide to improve and standardize methods for estimating communitywide carbon emissions inventories and forecasts. Assumptions used in calculating the emissions inventory are detailed in Appendix A.

#### **Past carbon emissions inventories (1990, 2005)**

An estimate of past carbon emissions generated in Santa Barbara in the year 2005 was identified by "back casting" from the 2007 inventory. The estimate for this year is provided for the purpose of comparing forecasted future citywide vehicle emissions to the 2020 and 2035 regional SB 375 vehicle emissions targets for Santa Barbara County (zero net increase in per capita carbon vehicle emissions from 2005 per capita levels).

Past emissions generated in Santa Barbara in the year 1990 were estimated for comparison of projected future total citywide emissions to the AB 32 target for the year 2020 (reduction of overall carbon emissions generation to 1990 levels). The back casts used data and trend lines from prior years (e.g., utility use). Where available 1990 data was lacking (e.g. vehicle trip generation), the methodology identified by the California Air Resources Board (CARB) AB 32 Scoping Plan was used, which estimates 1990 emissions levels at 15% less than 2005 levels.

#### **Current carbon emissions inventory (2010)**

A 2010 citywide carbon emissions inventory provides a more recent update to better characterize present levels of community carbon emissions generation, and also provides an additional trend point from the 2007 baseline to assist in future forecasts. The 2010 emissions inventory used utility, land use, trip generation, and census population data.

#### **Trends**

The past (1990, 2005), baseline (2007), and present (2010) communitywide emissions inventories show vehicle emissions first increasing and then beginning to level off. Electricity consumption emissions and landfill emissions show decreasing trends due to measures already put in place. Off-road construction vehicle and equipment emissions and commercial natural gas consumption emissions show increasing trends. Estimates of overall emissions levels for 2007 and 2010 already meet the 2020 target of reducing to 1990 levels.

**Figure 2-2 Past and Present Santa Barbara Citywide Carbon Emissions**  
(annual metric tons CO<sub>2</sub>e)

	1990	2005	2007	2010
Population	85,571	90,160	89,234	88,410
<b>Scope 1 Emissions (direct emissions within City)</b>				
<b>On-Road Vehicle Emissions</b>				
Internal City Trips	120,814	149,757	149,585	146,567
Commute Trips	61,566	76,315	77,094	76,372
Other Non-Internal Trips	138,612	171,818	179,155	182,792
<i>Subtotal – On-Road Vehicle Emissions</i>	<i>320,992</i>	<i>397,890</i>	<i>405,834</i>	<i>405,731</i>
<i>Per Capita On-Road Vehicle Emissions</i>	<i>3.751</i>	<i>4.413</i>	<i>4.548</i>	<i>4.589</i>
<b>Off-Road Vehicle/Equipment Emissions</b>				
Construction	20,301	27,317	27,632	28,057
Industrial/Commercial Equipment	7,497	7,408	7,278	7,137
Lawn and Garden	1,421	1,459	1,446	1,414
Miscellaneous Equipment	2,066	2,456	2,640	2,964
<i>Subtotal Off-Road Vehicle/Equipment Emissions</i>	<i>31,285</i>	<i>38,640</i>	<i>38,997</i>	<i>39,573</i>
<i>Per Capita Off-Road Vehicle/Equipment Emissions</i>	<i>0.366</i>	<i>0.429</i>	<i>0.437</i>	<i>0.448</i>
<b>Natural Gas Consumption</b>				
Residential	76,363	75,636	73,090	73,237
Commercial	35,603	41,097	42,182	44,002
Industrial	1,191	539	579	543
<i>Subtotal – Natural Gas Consumption Emissions</i>	<i>113,157</i>	<i>117,272</i>	<i>115,851</i>	<i>117,782</i>
<i>Per Capita Natural Gas Consumption Emissions</i>	<i>1.322</i>	<i>1.301</i>	<i>1.298</i>	<i>1.332</i>
<b>Landfill Decomposition</b>				
<i>Subtotal - Las Positas Landfill Decomposition</i>	<i>20,578</i>	<i>9,720</i>	<i>8,794</i>	<i>7,592</i>
<i>Per Capita Landfill Decomposition Emissions</i>	<i>0.240</i>	<i>0.108</i>	<i>0.099</i>	<i>0.086</i>
<b>Subtotal – Scope 1 Emissions</b>	<b>486,012</b>	<b>563,522</b>	<b>569,476</b>	<b>570,678</b>
<b>Per Capita – Scope 1 Emissions</b>	<b>5.680</b>	<b>6.250</b>	<b>6.382</b>	<b>6.455</b>
<b>Scope 2 Emissions (indirect emissions outside City from City electricity and water consumption)</b>				
<b>Electricity Consumption within City</b>				
Residential	68,615	50,317	48,667	45,778
Commercial	71,227	71,727	69,107	62,262
Industrial/Institutional	61,413	25,944	24,972	22,554
Water Pumping	2,049	1,438	1,453	1,455
Street Lighting	1,783	773	1,265	1,169
<i>Subtotal Electricity Consumption Emissions</i>	<i>205,087</i>	<i>150,199</i>	<i>145,464</i>	<i>133,218</i>
<i>Per Capita Electricity Consumption Emissions</i>	<i>2.397</i>	<i>1.666</i>	<i>1.630</i>	<i>1.507</i>
<b>State Water Project Electricity Consumption</b>				
<i>Subtotal State Water Project Electricity Consumption</i>	<i>0</i>	<i>1,077</i>	<i>461</i>	<i>607</i>
<i>Per Capita State Water Project Electricity Consumption</i>	<i>0</i>	<i>0.01</i>	<i>0.005</i>	<i>0.007</i>
<b>Subtotal Scope 2 Emissions</b>	<b>205,087</b>	<b>151,276</b>	<b>145,925</b>	<b>133,825</b>
<b>Per Capita Scope 2 Emissions</b>	<b>2.397</b>	<b>1.678</b>	<b>1.635</b>	<b>1.514</b>
<b>Scope 3 Emissions (miscellaneous and lifecycle emissions outside City)</b>				
<b>Landfill Decomposition</b>				
Tajiguas Landfill Emissions - Annual Waste	33,289	5,068	4,432	3,796
<b>Subtotal Scope 3 – Tajiguas Landfill Emissions</b>	<b>33,289</b>	<b>5,086</b>	<b>4,432</b>	<b>3,796</b>
<b>Per Capita Scope 3 Tajiguas Landfill Emissions</b>	<b>0.389</b>	<b>0.056</b>	<b>0.050</b>	<b>0.043</b>
<b>TOTAL ANNUAL COMMUNITY EMISSIONS</b>	<b>724,388</b>	<b>719,866</b>	<b>719,833</b>	<b>708,299</b>
<b>Per Capita Annual Community Emissions</b>	<b>8.465</b>	<b>7.984</b>	<b>8.067</b>	<b>8.012</b>

### 2.2.3 City government operations and airport emissions

#### Past and present greenhouse gas emissions inventories of City government operations

Since 2005, the City has calculated annual inventories of greenhouse gas emissions associated with City government operations, including buildings, facilities, and vehicles.

With staff efforts throughout City departments since that time, carbon emissions from City government operations have been substantially reduced. By 2008, emissions from City operations were 14.5% lower than 1990 levels, surpassing the Kyoto Protocol target identified in the 2005 Mayor's Agreement (reduction of emissions to 7% below 1990 levels by 2012). Further reductions are anticipated in coming years.

<b>Figure 2-3 Past &amp; Present City Government Operations Carbon Emissions</b>	
<b>Year</b>	<b>CO<sub>2</sub> Emissions (metric tons CO<sub>2</sub>e)</b>
1990 (estimate)	13,145
2005	11,766
2006	11,784
2007	12,750
2008	11,232
2009	11,412
2010	10,993
2011	10,793
2012 (forecast estimate)	10,679
2013 (forecast estimate)	9,856
2014 (forecast estimate)	9,794

<b>Figure 2-4 2010 City Government Operations Carbon Emissions</b>			
<b>Emissions Sources</b>	<b>Quantity</b>	<b>Units</b>	<b>CO<sub>2</sub> Emissions (metric tons CO<sub>2</sub>e)</b>
Natural gas usage	181,208	therms	961.49
Vehicle fleet (gasoline)	202,060	gallons	1,774.08
Vehicle fleet (biodiesel)	59,151	gallons	558.97
Vehicle fleet (CNG)	1,541	GGE	10.57
Harbor patrol (gasoline)	4,413	gallons	38.75
Harbor patrol (diesel)	470	gallons	4.80
<b>Total Direct Emissions</b>			<b>3,348.66</b>
Electricity usage	23,275,165	kWh	7,644.86
<b>Total Indirect Emissions</b>			<b>7,644.86</b>
<b>Total (Direct &amp; Indirect)</b>			<b>10,993.52</b>

### Santa Barbara Airport emissions

Aircraft emissions estimates are presented here for information purposes and not included as part of the communitywide inventory for the City Climate Plan, due to federal preemption of local control over aircraft emissions. This is consistent with guidance on preparing community carbon emission inventories from the California Air Resources Board (CARB) and the California Air Pollution Control Officers Association (CAPCOA), as well as the Bay Area Air Quality Management District (BAAQMD).

The Santa Barbara Airport conducted an emissions inventory and projections using a base year of 2005, which was last updated in 2008. Calculations below for emissions from airport vehicle, Auxiliary Power Units/ Ground Support Equipment (APU/GSE) and aircraft landing and takeoff (LTO) cycles are from the inventory and were then scaled to 1990, 2007, and 2010 flight data from the FAA's Air Traffic Activity Data System (ATADS). Forecasts were then developed for the years 2020 and 2030, assuming a constant per capita aircraft usage from the 2010 year.

<b>Figure 2-5 Aircraft Operations at Santa Barbara Airport: Estimated Carbon Emissions</b> (Annual Metric Tons CO <sub>2</sub> e)						
	<b>1990</b>	<b>2005</b>	<b>2007</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>
Aircraft Landing Takeoff Cycle	9,493	7745	6,036	5329	5,549	5,733
Auxiliary Power Units/ Ground Support Equipment	313	255	199	176	183	189
Motor Vehicles	150	198	154	136	142	146
<b>Total Emissions</b>	<b>9,956</b>	<b>8,198</b>	<b>6,389</b>	<b>5,641</b>	<b>5,874</b>	<b>6,068</b>
<b>Per Capita Emissions</b>	<b>0.116</b>	<b>0.091</b>	<b>0.072</b>	<b>0.064</b>	<b>0.064</b>	<b>0.064</b>

### **2.2.4 *Without Plan* forecasted future community carbon emissions for 2020 and 2030 (“business as usual” + State legislative reductions)**

Forecasts of future citywide emissions are first calculated from the 2007 baseline inventory without adding in reductions from the Climate Plan measures. The forecasts reflect future carbon-generating activities by residents, businesses, and institutional uses (e.g., oil and gas combustion for electricity and vehicle fuels) continuing at current trends.

Incremental City development and population growth under General Plan Update policies is assumed and the General Plan traffic model is used to project future vehicle trip generation. The forecasts account for State legislative measures in place that would reduce future carbon emissions generation statewide, including in Santa Barbara (e.g., Pavley auto emissions standards, cap-and-trade stationary source regulations, energy portfolio targets).

Carbon emissions forecasts for 2020 and 2030 without implementation of climate plan measures (business as usual with State legislative reductions scenarios) are provided below in Figure 2.4. Emissions forecasts showing reductions with implementation of the climate plan strategies are provided in Section 2.4 - Effectiveness of Strategies.

#### **Trends**

The forecasted *Without Plan* community emissions for the years 2020 and 2030 show continuing reduction in overall Santa Barbara emissions citywide, and reductions in on-road vehicle emissions, electricity and natural gas consumption emissions, and landfill gas emissions, with off-road vehicle/equipment emissions leveling off. These trends reflect emission-reducing measures already undertaken or in place.

The 2020 *Without Plan* forecast with State legislative reductions shows overall citywide annual emissions continuing to meet the 2020 target of 1990 levels. The 2020 and 2030 *Without Plan* per capita vehicle emissions forecasts also meet the regional 2020 and 2030 targets for not exceeding 2005 levels.

**Figure 2-6 Without Plan Forecasted Future Citywide Carbon Emissions 2020 and 2030**(Annual Metric Tons CO<sub>2</sub>e)

	<b>2020 Business as Usual</b>	<b>2020 BAU+State Actions</b>	<b>2030 Business as Usual</b>	<b>2030 BAU+State Actions</b>
Population	92,064	92,064	95,110	95,110
<b>Scope 1 (direct emissions within City)</b>				
<b>On-Road Vehicle Emissions</b>				
Internal City Trips	182,594	130,773	188,922	116,759
Commute Trips	99,682	71,392	107,555	66,447
Other Non-Internal Trips	266,912	191,161	324,081	194,039
<i>Subtotal – On-Road Vehicle Emissions</i>	<i>549,188</i>	<i>393,326</i>	<i>620,628</i>	<i>377,245</i>
<i>Per Capita On-Road Vehicle Emissions</i>	<i>5.965/person</i>	<i>4.272/person</i>	<i>6.525/person</i>	<i>3.966/person</i>
<b>Off-Road Vehicle/Equipment Emissions</b>				
Construction	29,217	29,217	30,183	30,183
Industrial/Commercial Equipment	7,432	7,432	7,678	7,678
Lawn & Garden	1,473	1,473	1,522	1,522
Miscellaneous Equipment	3,087	3,087	3,189	3,189
<i>Subtotal Off-Road Vehicle/Equipment Emissions</i>	<i>41,209</i>	<i>41,209</i>	<i>42,572</i>	<i>42,572</i>
<i>Per Capita Off-Road Vehicle/Equipment Emissions</i>	<i>0.448/person</i>	<i>0.448/person</i>	<i>0.448/person</i>	<i>0.448/person</i>
<b>Natural Gas Consumption</b>				
Residential	75,408	74,800	78,011	76,703
Commercial	45,757	45,182	47,221	46,489
Industrial	786	643	1,077	986
<i>Subtotal – Natural Gas Consumption Emissions</i>	<i>121,951</i>	<i>120,625</i>	<i>126,309</i>	<i>124,178</i>
<i>Per Capita Natural Gas Consumption Emissions</i>	<i>1.325/person</i>	<i>1.310/person</i>	<i>1.328/person</i>	<i>1.306/person</i>
<b>Landfill Decomposition</b>				
<i>Subtotal - Las Positas Landfill Decomposition</i>	<i>4,592</i>	<i>3,045</i>	<i>2,785</i>	<i>1,847</i>
<i>Per Capita Las Positas Landfill Decomposition</i>	<i>0.050/person</i>	<i>0.033/person</i>	<i>0.029/person</i>	<i>0.019/person</i>
<b>Subtotal – Scope 1 Emissions</b>	<b>716,940</b>	<b>558,205</b>	<b>792,294</b>	<b>545,842</b>
<b>Per Capita – Scope 1 Emissions</b>	<b>7.787/person</b>	<b>6.063/person</b>	<b>8.330/person</b>	<b>5.739/person</b>
<b>Scope 2 (indirect emissions outside City, from City electricity and water consumption)</b>				
<b>Electricity Consumption in City</b>				
Residential	47,356	39,918	49,248	40,411
Commercial	65,524	55,970	68,243	57,661
Industrial/Institutional	23,979	21,946	25,690	23,057
Water Pumping	1,516	1,309	1,566	1,352
Street Lighting	1,217	1,052	1,258	1,086
<i>Subtotal Electricity Consumption Emissions</i>	<i>139,592</i>	<i>118,861</i>	<i>146,005</i>	<i>122,456</i>
<i>Per Capita Electricity Consumption Emissions</i>	<i>1.516/person</i>	<i>1.291/person</i>	<i>1.535/person</i>	<i>1.288/person</i>
<b>State Water Project Electricity Consumption</b>				
<i>Subtotal SWP Electricity Consumption</i>	<i>836</i>	<i>722</i>	<i>836</i>	<i>722</i>
<i>Per Capita SWP Electricity Consumption</i>	<i>0.009/person</i>	<i>0.008/person</i>	<i>0.009/person</i>	<i>0.008/person</i>
<b>Subtotal – Scope 2 Emissions</b>	<b>140,428</b>	<b>119,583</b>	<b>146,841</b>	<b>123,178</b>
<b>Per Capita – Scope 2 Emissions</b>	<b>1.525/person</b>	<b>1.299/person</b>	<b>1.544/person</b>	<b>1.295/person</b>
<b>Scope 3 (indirect emissions outside City, miscellaneous and lifecycle emissions)</b>				
<i>Subtotal –Tajiguas Landfill (waste disposal)</i>	<i>3,959</i>	<i>3,959</i>	<i>4,090</i>	<i>4,090</i>
<i>Per Capita – Tajiguas Landfill</i>	<i>0.043/person</i>	<i>0.043/person</i>	<i>0.043/person</i>	<i>0.043/person</i>
<b>Subtotal - Scope 3 Emissions</b>	<b>3,959</b>	<b>3,959</b>	<b>4,090</b>	<b>4,090</b>
<b>Per Capita – Scope 3 Emissions</b>	<b>0.043/person</b>	<b>0.043/person</b>	<b>0.043/person</b>	<b>0.043/person</b>
<b>TOTAL ANNUAL COMMUNITY EMISSIONS</b>	<b>861,326</b>	<b>681,746</b>	<b>943,225</b>	<b>673,110</b>
<b>Per Capita Annual Community Emissions</b>	<b>9.356/person</b>	<b>7.405/person</b>	<b>9.917/person</b>	<b>7.077/person</b>

## 2.3 Carbon Emissions Reduction Strategies

This section identifies City efforts already in place that reduce carbon emissions in City government operations and the community at large, and additional future strategies to further reduce carbon emissions in the years ahead.

The strategies are grouped under the headings of energy efficiency and green building; renewable energy; travel fuel reduction and land use; vegetation; waste reduction; and water conservation.

Many of the future strategies have already been adopted as implementation actions in the *Plan Santa Barbara* General Plan Update adopted by City Council in December 2011.

Overall climate goals identified in the City General Plan are provided below and pertinent policies are identified for each topic.

### **Santa Barbara General Plan Excerpts OVERALL CLIMATE GOALS AND POLICIES**

#### **Sustainability Principles – Environment**

Efficiently and effectively managing and protecting our natural and physical resources entails practicing innovative strategies that achieve protection, conservation, enhancement, reduced consumption, reuse, recycling, self-sufficiency, and adaptation to changing climate conditions, should they occur.

#### **Environmental Resources Element – Climate**

Goal. Reduce Greenhouse Gases. Reduce where practicable greenhouse gas emissions contributions to climate change, and to air pollution and related health risks.

Policy ER1. Climate Change. As applicable, private development and public facilities and services may be required to incorporate measures to minimize contributions to climate change and to adapt to climate changes anticipated to occur within the life of each project.

Implementation Action ER1.1. Comprehensive Climate Change Action Plan. Prepare a comprehensive climate action plan, toward compliance with AB 32, to address climate change concerns including reducing greenhouse gas absorption, and adaptation to climate change. The climate action plan will include evaluation of community energy use (i.e., energy used by buildings and infrastructure); waste and recycling, water and wastewater systems; transportation; and community design.

**Figure 2-7**





### 2.3.1 Energy Efficiency and Green Building Measures

These measures reduce carbon emissions that result from the combustion of fossil fuels for electricity generation, through more efficient electrical devices and conservation practices in existing and new structures.

In addition to addressing climate change, these measures benefit the community by reducing energy operating costs, reducing dependence on foreign oil, conserving limited energy and water resources, and reducing air pollution.

Extensive efforts over the past decade have made City government facilities and operations more energy efficient. Electricity and natural gas consumption has been reduced with more energy-efficient equipment and operational changes to use less energy. Lighting energy demand in City facilities has declined by approximately 50% since 2005. Energy audits of buildings have resulted in an annual savings of \$399,000 on operations costs. City actions have also promoted energy efficiency of new development and existing development.

**Santa Barbara General Plan Excerpts**  
**ENERGY EFFICIENCY GOALS AND POLICIES**

**Environmental Resources Element – Energy**

Goal. Reduce Fossil Fuel Use. Reduce fossil fuel use through increased efficiency and conservation, and by developing renewable energy sources.

Policy ER3. Decrease City's Global Footprint. In addition to promoting reduced unit size, building footprints and GHG emissions, and energy conservation, promote the use of more sustainable building and landscaping materials and methods.

Policy ER5. Energy Efficiency and Conservation. As part of the City's strategy for addressing climate change, minimizing pollution of air and water, depleting nonrenewable resources and insulating from volatility of fossil fuel prices, dependence on energy derived from fossil fuels shall be reduced through increased efficiency, conservation, and conversion to renewable energy sources when practicable and financially warranted.

**Figure 2-8**

### Community activities

Beyond City government, numerous private actions have been undertaken in the Santa Barbara community to conserve energy. Businesses, institutions, groups, and individuals throughout Santa Barbara have upgraded existing buildings, equipment, and practices to conserve energy and save money. Energy efficiency features have been incorporated in the design and construction of many new structures.

Following are a few examples of such energy-efficiency and green building actions in the Santa Barbara community:

- *Utility upgrade rebates.* In collaboration with the statewide Energy Upgrade California program, Southern California Edison and Southern California Gas Company have instituted incentive and assistance programs for retrofitting to energy-efficient systems. Substantial rebates have been provided for commercial and whole house energy upgrades. Home improvement services have been provided for income-qualified renters and homeowners. Home energy efficiency surveys provide customized recommendations for energy-saving measures from online or mail-in surveys.
- *Built Green.* Built Green is a network of contractors, architects, designers, builders, developers, suppliers, lenders, and real estate agents providing information about green building options that are more cost-effective, healthier, safer, and more protective of the environment. A checklist rating system can guide hundreds of decisions typical in the building process including options for energy-efficient development designs, materials, and processes. The Built Green Resource Center provides information about green building strategies, features, and products.
- *Green Building Alliance* is a group of local architects, civil engineers, general contractors, interior designers, solar contractors, landscape architects, and landscape contractors that practice green building techniques.
- *Shoreline Café* instituted energy management changes, replacing outdoor heaters with a forced air system to reduce natural gas usage by 65%; converting outdoor light fixtures with compact fluorescent bulbs to cut bulb wattage by 80%; and upgrading to energy-efficient kitchen appliances, with an estimated annual energy costs savings of \$15,000.
- *Victoria Garden Mews condominium project* in downtown Santa Barbara is an example of energy-efficient green building in new construction (LEED platinum project). The four-unit project provided a 90% reduction of energy use over prior Title 24 standards through passive solar design, high performance windows, extra insulation, and solar water heating. 100% of electricity is produced by an on-site solar photovoltaic system. Water use is cut 40% with efficient plumbing features, rainwater catchments, and on-site retention of run-off. Lumber is from sustainable forests, and low-emitting materials are used (e.g., paints, coatings, carpets).

### City activities

The following summarizes City activities already undertaken or in place, and future City strategies toward further energy efficiency and green building in government operations and in the larger community. [See also subsequent sections on transportation, waste management, and water conservation measures, which also reduce energy use.]

Many of the future programs identified are the same or are based on policies recently adopted as part of the City's December 2011 General Plan Update (GPU). Where this is the case, the GPU policy number is noted.

**ENERGY EFFICIENCY AND GREEN BUILDING: EXISTING CITY MEASURES IN PLACE****City Government Operations**

- ***City energy use and reduction policy*** (City program)  
Guidelines were established for City staff use of lighting, computers, electrical devices, heating, and air conditioning. These include lower lighting levels, temperature guidelines, hibernation of computers, and restrictions on personal electronic devices.
- ***City structure energy audits and energy-efficient equipment*** (City program)  
Energy audits were performed on City facilities where maintenance projects were planned, and energy modifications made. Compact fluorescent and light emitting diode (LED) lighting are used on City buildings. New electrical devices and equipment must be Energy Star or EPEAT certified for low energy use. Modifications included:
  - Installing energy-efficient lighting fixtures
  - Installing occupancy sensors and timer switches
  - Installing lower energy air conditioning systems using fresh air cooling on mild days
  - Installing direct digital controls on heating and air conditioning (HVAC) units
  - Adding sub-meter facilities to monitor and analyze energy use
  - Mechanical retro-commissioning of City facilities
  - Replacing pumps and motors with more efficient, variable speed equipment
  - Consolidating office equipment.
- ***City streetlights and signals*** (City program)  
In 2002, the City's entire system of traffic signals was converted to light-emitting diode LED lighting. All streetlights are now powered by high-pressure sodium or LED lamps.
- ***LEED certified City buildings*** (City program)  
It is City policy that new City-owned buildings achieve at least a silver level of LEED (Leadership in Energy and Environmental Design) certification, which reflects substantial energy efficiency. City efforts in recent years on both new structures and retrofitting existing structures have resulted in LEED certification status for the Community Development/Public Works department offices (platinum status), Airport rental car facility (gold), and fire station headquarters and emergency operations center (gold), as well as for the Granada garage and 914 State Street rest rooms. The new Airport terminal is in place and on-track for receiving LEED gold certification.
- ***City Airport facilities*** (City program)  
The Santa Barbara Airport has numerous measures in place and recent upgrades that reduce greenhouse gas emissions. These include:
  - Ample airfield capacity and short touch-down to take-off times that reduce emissions from idling and planes waiting to take off
  - Centralized location of terminal and fixed-base operators and cross-field taxiway that reduce taxi times

- Centralized terminal and ample parking capacity that reduce vehicle roving
- Bus and taxi services and bicycle access that allow alternative ground transportation; and electric ground service equipment.
- Pilot-controlled lighting that saves energy
- Energy efficient airfield lighting and transformers

### **Communitywide Measures**

- ***Architecture 2030 challenge*** (City program)

In 2007, Santa Barbara became the first city in the country to adopt the Architecture 2030 Challenge, a nationwide movement for the built environment to become carbon neutral by the year 2030 by reducing building energy use in new construction and major renovations.

- ***City building code energy conservation ordinance for new buildings*** (City program)

In 2008, the City instituted the most stringent code requirements in the State for energy efficiency of new structures (including residential appliances, heating/cooling systems, swimming pool heaters/pumps). New buildings were required to be at least 10-20 percent more energy efficient than the 2005 building energy efficiency standards, and new residential buildings and additions had to exceed State 2005 Title 24 energy efficiency standards by at least 20 percent. In 2010, the State followed suit with updated statewide CALGreen building code energy requirements, which were incorporated into the City's energy ordinance.

- ***City solar access ordinance*** (City program)

The ordinance provides standards for protection of solar access in residential buildings and avoidance of significant shadows from adjacent buildings, which assists in passive heating.

- ***South Coast Energy Efficiency Partnership*** (Joint agency program/City participation)

The partnership is a collaborative effort among the cities of Santa Barbara, Carpinteria, and Goleta, County of Santa Barbara, Southern California Edison Company, and Southern California Gas Company to promote energy efficiency. A Partnership program provided 568 area businesses with free energy-efficient lighting and control systems. A mobile home program provides residents with free energy-efficient products and services, including compact fluorescent light (CFL) bulbs, low-flow showerheads, weatherization, and duct testing. Community events were held to exchange 800 traditional light bulbs for compact fluorescent light (CFL) bulbs, and more than 1,300 incandescent holiday light strands for LED holiday lights, reducing energy use by up to 90% for each replacement.

- ***SB County emPowerSBC financing program*** (County program/City participation)

In 2010, the City approved participation in the countywide municipal financing program that provides loans with low rates and flexible repayment term to property owners for energy-saving retrofit projects that also improve indoor comfort and lower utility bills. The program is a partner with the statewide Energy Upgrade California program.

- ***Built Green Santa Barbara*** (Private program/City participation)

The City has worked with Built Green to provide information and classes on green building processes and materials including energy efficiency and passive heating /cooling design.

- **Green Business Program of Santa Barbara County** (County program/City participation)

This program offers incentives and assistance to encourage businesses to take voluntary actions to protect, preserve, and improve the environment beyond what current laws require. Businesses are certified by adopting conservation and pollution prevention measures.

<b>ENERGY EFFICIENCY &amp; GREEN BUILDING: ADDITIONAL FUTURE CITY ACTIONS</b>
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### **City Government Operations**

1. **Energy-efficient City facilities** (City program; General Plan (GP) policy ER5.2; through 2030)  
Continue implementing programs through the City Sustainable Santa Barbara program for retrofitting of municipal systems with energy efficient equipment, systems, and programs.  
The following equipment upgrades are currently planned to further improve energy efficiency at City buildings: upgrade computer systems to provide automated computer workstation power-off function; replace separate copier, printer, fax, and scanner units with shared multi-function printing units; virtualize 35 remaining servers in primary City Hall and Business Continuity data centers to reduce electrical power and cooling requirements.
2. **Recreational field lighting efficiency projects** (City program; target 2015)  
Install energy-efficient lighting projects at Dwight Murphy and Pershing Ball Fields.

### **Communitywide Measures**

3. **Energy efficient buildings—voluntary actions** (City program; GP policy ER5.1; through 2030)  
Encourage all new construction to be designed and built consistent with City green programs and policies, the California Green Building Code, and Architecture 2030 goals for energy efficiency in buildings.  
  
Further reduce energy consumption over time in both new building and through retrofits. Establish a voluntary program and time line for increasing the energy efficiency and carbon neutrality of new buildings or additions, and existing building stock. Provide:
  - (a) Information on current energy use and conservation options;
  - (b) Incentives for voluntary upgrades;
  - (c) Voluntary incremental upgrades may be encouraged at time of sale, and/or other methods for greening the existing building stock; and
  - (d) Tools for financing for energy-efficiency upgrades and on-site solar and wind power generation. Continue City work with the County emPower program for financing private energy efficiency and alternative source projects, including assisting with applications, inspections, and outreach education and promotion.
  - (e) County Green Business program. Continue City work to check and certify participating local green businesses.

**4. Energy efficient buildings—further outreach, incentives, requirements** (City program; to 2030)

If there is insufficient progress from the voluntary programs above toward the City's Architecture 2030 building energy efficiency goals, as identified through periodic assessments (using 50% progress by 2020 as a benchmark), institute further actions.

Additional future actions may include the following:

- (a) *Community energy efficiency outreach.* Expand outreach programs to promote energy conservation and efficiency in the community, such as the following measures: (1) an energy efficiency challenge campaign for community residents; (2) energy conservation campaigns specifically targeted to residents, businesses, and institutions; (3) further education and assistance with applications and inspections; and (4) an exchange program for high-energy-use items (e.g., halogen torchiere lamps).
- (b) *Incentives and funding assistance.* Expand financial incentive measures, such as: (1) a low-income weatherization assistance program; and (2) other energy efficiency upgrade assistance targeted to residential, business, and institutional sectors.
- (c) *Reach code energy efficiency ordinance.* Implement City municipal code amendment to require energy efficiency levels for new development and redevelopment beyond California Green Building Code standards.
- (d) *Lighting standards.* Establish additional standards for energy efficiency of outdoor lighting in the City lighting ordinance, which may include measures to provide for full cut-off light fixtures at parking lots and on buildings where safety standards are met; provide photocells or astronomical time switches on all permanently installed exterior lighting; and provide exterior and security lights with motion detectors.
- (e) *Upgrades at time of sale.* Adopt ordinance provisions to establish requirements for energy efficiency upgrades at the time of property sale to increase the efficiency of existing building stock.

**5. Green building** (City program; GP policies ER3; ER3.1; ongoing to 2030)

In addition to promoting reduced unit size, building footprints, and GHG emissions, and energy conservation, promote the use of more sustainable building and landscaping materials and methods. Establish additional green building incentives for the use of locally harvested, renewable building or manufacturing materials.

### 2.3.2 Renewable Energy Measures

Renewable energy means power sources that will not be depleted, such as solar, wind, geothermal, hydroelectric, biomass, methane, and wave energy, as well as alternative non-petroleum fuels such as bio-gas, and energy storage devices such as fuel cells. Use of renewable energy sources reduces carbon emissions that result from combustion of fossil fuels for electricity and vehicles powered with petroleum fuels.

California law (AB 1007) requires that by the year 2020, at least one-third of the State's energy is to come from renewable sources. This objective is occurring at a time when electricity demands are expected to continue rising, even with conservation measures, but look to be met with less fossil fuels and more renewable energy sources.

Renewable energy use also benefits the community by reducing energy operating costs, reducing dependence on foreign oil, conserving limited energy resources, and reducing air pollution.

**Santa Barbara General Plan Excerpts  
RENEWABLE ENERGY GOALS AND POLICIES**

**Environmental Resources Element – Energy**

Goal. Reduce Fossil Fuel Use. Reduce fossil fuel use through increased efficiency and conservation, and by developing renewable energy sources.

Policy ER6. Local and Regional Renewable Energy Resources. Provide both within the city, and regionally through working with the County and other local jurisdictions or parties, opportunities to preserve, promote and participate in the development of local renewable energy resources such as solar, wind, geothermal, wave, hydro, methane and waste conversion.

**Figure 2-9**

### Community activities

Numerous renewable energy activities have occurred in the Santa Barbara community by private individuals, businesses, institutions, and interest groups. Here are a few examples:

- *Solar photovoltaic panel installations.* There are at least 426 solar photovoltaic panel systems of various sizes installed within Santa Barbara, put in by individual residents, businesses, and institutions, and an additional 140 solar installations in process. Projects of particular note:  
 Westmont College. Photovoltaic panels were installed on forty faculty homes on the campus, generating more than 157,000 kilowatt-hours of energy annually to fully power the neighborhood and reduce carbon dioxide generation by 3,000 tons.  
 City College. More than 1,300 solar panels installed in the West Campus parking lot collect a combined 130 kilowatts of energy, about 30% of the West Campus energy needs.

- *Community Environmental Council (CEC) Blueprint and Fossil Free by '33 Program.* In 2007, the non-profit organization CEC produced *A New Energy Direction: A Blueprint for Santa Barbara County*, which provides energy information and strategies toward the goal of becoming fossil free by 2033, including through renewable energy sources such as solar, wind, and ocean, and alternative travel modes, fuels, and vehicle technologies.
- *Solarize Santa Barbara solar price incentive program.* A group purchase discount program was instituted by the Community Environmental Council which helped 49 families on the South Coast install solar facilities generating a combined total of 205 kilowatts of power.
- *Earth Day festival.* Since 1970, the annual Santa Barbara Earth Day Festival has been hosted by the Community Environmental Council with cooperation of dozens of sponsors and hundreds of exhibitors. Now attracting approximately 35,000 people, the festival provides public information about sustainable products and practices, including renewable energy.
- *County of Santa Barbara courthouse geothermal project:* Installation of a subsurface geothermal system to heat and cool the Records office.
- *Marborg Industries.* A local waste management services business, Marborg had their corporate office certified through the County Green Business program, and has engaged with Energy Star and LEED (Leadership in Energy and Environmental Design) programs for building upgrades. Actions included installing a 30 kW photovoltaic system that generates 13% of their daily energy consumption; use of compressed natural gas (CNG) trash collection trucks; and use of biodiesel (B5) fuel.

### City programs

Following are descriptions of existing City programs and identified future strategies for furthering renewable energy use in City government facilities and Santa Barbara community.

#### RENEWABLE ENERGY: EXISTING CITY MEASURES IN PLACE

##### City Government Operations

The City has increased its use of renewable energy in City facility operations as a percentage of total energy consumed from 16% in 2004 to about 25% in 2010 with actions such as those listed below.

- ***Solar installations*** (City program)  
Since 2007, the City has installed the following solar energy systems at City facilities:
  - Solar voltaic system (330 kW) at the Public Works corporate yard, which produces 520,000 kWh/year (equivalent to the electricity supply for 1,040 homes)
  - Photovoltaic solar panel array (15 kW) at Fire Station 2 supplying half its electricity needs
  - Solar thermal systems to heat water at five harbor marina restrooms, cutting natural gas consumption by approximately 30%.



- **Wastewater treatment plant energy** (City program)

A twin fuel cell system converting methane to electricity powered approximately half of the plant's needs with a 500-kilowatt capacity. This first commercially operated fuel cell in the State and the renewable energy system won the League of California Cities Helen Purnam Grand Prize award. The system is being replaced in 2012 with reciprocating engine co-generation and power purchase agreement.

- **Grease-to-gas injection project at treatment plant** (City program; target 2013)

The project at the El Estero wastewater treatment plan diverts fats, oil, and grease (FOG) into the El Estero digesters. This reduces truck trips currently required to haul the material long distances for disposal, and generates an increased amount of methane that can be used for co-generation of heat and electricity, reducing up to 17 metric tons of carbon dioxide equivalent emissions annually.

### **Citywide Measures**

- **Housing Authority solar projects** (City program)

The Housing Authority of the City of Santa Barbara received federal grant money to install photovoltaic panels on two affordable senior housing complexes (Vista La Cumbre on south La Cumbre Lane, and Presidio Springs on Laguna Street) as well as on a Laguna Street maintenance facility, for a combined system of 100-kilowatts of power.

- **Solar design guidelines** (City program)

In 2006, the City adopted solar design guidelines and a recognition program to encourage photovoltaic systems that are high performing as well as integrated with building design. Passive solar guidelines also encourage building siting, orientation, materials, construction techniques, and landscaping to reduce long-term energy needs. The City's annual solar design recognition program has awarded recognition to dozens of exemplary solar installations throughout the City.

## **RENEWABLE ENERGY: ADDITIONAL FUTURE CITY ACTIONS**

### **City Government Operations**

6. **Hydroelectric plant recommissioning** (City program; target 2013)

Recommissioning the City's small hydroelectric plant will result in the production of clean and renewable hydroelectric power. It is estimated that the plant will initially produce 1600 megawatt hours (MWh) of power annually, and due to siltation at Gibraltar Dam, will gradually reduce to a steady state production of 975 MWh, equivalent to the energy demand of approximately 200 single-family homes.

7. **Solar photovoltaic project at Airport long-term parking lot** (City program; target 2015)

Project for installation of 500 kw photovoltaic panels on canopies over portions of the Airport long-term parking would utilize a power purchase agreement (PPA) for City purchase of energy.

**Communitywide Measures**

- 8. *Community choice aggregation*** (City program; GP policy ER6.1; target 2020-2030)  
Conduct a feasibility study to include a cost-benefit analysis and carbon footprint assessment for a Community Choice Aggregation arrangement as either a bulk purchaser or producer of energy from alternative resources.
- 9. *Alternative/advanced fuels*** (City program; GP policy ER6.2; target 2020)  
Support and implement the California Energy Commission and State Air Resources Board goal for alternative/advanced fuels set forth in AB 1007, for non-petroleum fuel use of 20% by 2020 and 30% by 2030.
- 10. *Incentives for alternative fuel infrastructure*** (City program; GP policy ER6.3; target 2015)  
Give priority through expedited processing to projects providing infrastructure for alternative/advanced fuels.
- 11. *Small wind generators*** (City program; GP policy ER6.4; target 2020)  
Identify and study regulatory obstacles to installing small individual or community wind generators, and prepare standards for siting, design, maintenance, and operation to ensure compatibility with adjoining land uses and protect environmental resources.
- 12. *Facilitate renewable energy technologies*** (City program; GP policy ER6.5; target 2020)  
Promote flexible design review standards and facilitate use of renewable energy technologies through streamlined planning and development rules, codes, processing, and other incentives.
- 13. *Solar energy*** (City program; GP policy ER6.6; target 2015)  
Encourage the use of solar photovoltaic arrays on new construction, redevelopment, and significant remodel projects, as appropriate, taking into consideration project scale and budget, building size, orientation, roof type, and current energy use.
  - (a) For multi-residential projects of three (3) or more units, require provision of a minimum two (2) kilowatts (kW) system per unit consistent with the City's Solar Energy System Design Guidelines, if physically feasible.
  - (b) For 1- or 2-unit residential projects, require provision of 300 square feet rectangular unobstructed roof area free of mechanical equipment and vents facing south, east, or west in a manner that future photovoltaic installation would be consistent with the City's Solar Energy System Design Guidelines, if physically feasible.
  - (c) For commercial and industrial projects, provide a minimum of five (5) kW of photovoltaic panel systems for every new square foot of building net floor area; or a photovoltaic system sized to meet a minimum of 30% of the average projected energy demand for the structure, whichever is lower.

### 2.3.3 Travel and Land Use Measures

Travel and land use measures aim to reduce carbon emissions from the combustion of petroleum-based vehicle fuels. Use of alternatives to petroleum-based fuels and single-occupancy vehicles reduces the number of petroleum-powered vehicle trips overall and per capita vehicle miles travelled.

Other important activities are industry efforts to develop lower emission vehicle and fuel technologies, as well as State and Federal regulatory measures and research funding assistance.

Examples of local methods to reduce vehicle trips and associated emissions include telecommuting, alternate work hours, ride sharing, and car sharing; use of alternate fuels and vehicle technologies (e.g., bio-fuels, hybrid and electric vehicles); and enhancing the convenience of using alternatives to driving alone, such as more pedestrian and bicycle connections and more frequent bus service. Land use measures include designations and incentives to establish more affordable housing close to employment and local services.

A related City objective is to maintain and enhance livable neighborhoods that are walkable and have a variety of commercial, employment, and recreational destinations within daily walking, bicycling, and transit distance of residences, especially in the Downtown core of the City. Methods include neighborhood planning to improve connectivity and land use mix; retrofitting transportation infrastructure; and mobility policies for designing new development.

**Santa Barbara General Plan Excerpts**  
**CIRCULATION AND LAND USE GOALS AND POLICIES**

**Circulation Element**

Goal and Vision. While sustaining or increasing economic vitality and quality of life, Santa Barbara should be a city in which alternative forms of transportation and mobility are so available and so attractive that use of an automobile is a choice, not a necessity.

**Land Use Element**

Goal. Mobility: Apply land use planning tools and strategies that support the City's mobility goals.

**Housing Element**

Goal. Regional Cooperation and Jobs/Housing Balance. Coordinate City efforts with those of surrounding communities towards balancing jobs and housing in the regional housing market.

**Figure 2-10**

Beyond climate protection, measures to reduce single-vehicle trips and petroleum-based fuel use have benefits to individuals and communities in reduced vehicle traffic congestion and air pollution, fuel and overall transportation cost savings, reduced dependence on foreign oil, benefits to public health and health care costs from more exercise, and greater sustainability and livability of neighborhoods.

### Community activities

There are many examples of private transportation and land use activities by individuals, businesses, institutions, and organizations in the Santa Barbara community that help reduce vehicle trips and associated emissions. Here are some examples:

- *Bicycle commuting.* Commuting by bicycle in Santa Barbara and on the South Coast is estimated to have increased from 3% to 5% in the last decade. An estimated 14,000 persons bike to the University of California, Santa Barbara campus each day, including City residents.
- *Hybrid and electric vehicles.* The number of Santa Barbara residents and employees that drive hybrid vehicles has grown over the past decade, and the area is expected to be one of the top markets for plug-in electric vehicles.
- *Cottage Hospital.* A private non-profit institution and large employer, Cottage Hospital has instituted a variety of incentives to reduce employee single-vehicle commute trips, including a parking cash-out program, bicycle parking, and employee shower facilities. Development of the Hospital's *Bella Riviera Workforce Homes* (115 new town houses) is underway. Seventy percent of the homes are to be sold to Cottage Hospital employees at affordable prices, creating the potential for substantial reduction of long-distance employee commute trips and emissions. The project also incorporates green building measures.
- *Santa Barbara Bicycle Coalition.* This volunteer organization runs Bici Centro, a do-it-yourself bicycle repair shop and skills education center in Santa Barbara, and promotes safe bicycling throughout Santa Barbara County.
- *COAST (Coalition for Sustainable Transportation).* COAST is a group of individuals active in community groups, businesses, and agencies that advocate for enhanced transportation options and integrated land use and transportation policies on the South Coast.
- *Mesa Architects neighborhood planning.* A group of architects is developing ideas for improving community, self-sufficiency, and sustainability of the Mesa neighborhood through connectivity improvements for vehicle, bicycles, and pedestrian walks and trails, and plans for commercial, institutional, and open space uses.

## City activities

Following are descriptions of existing City programs and identified future transportation and land use strategies for reducing petroleum-powered travel trips in City government operations and in the Santa Barbara community.

### TRAVEL & LAND USE: EXISTING CITY MEASURES IN PLACE

#### City Government Operations

- ***Fleet vehicles*** (City programs)

The City has reduced carbon emissions of City vehicle operations by the following actions:

*Alternative vehicle fuels and technology.* With gradual replacement of vehicles, the City now maintains a fleet with 36% of vehicles using alternative fuels or vehicles using advancements in technology to gain fuel efficiency. This includes 102 vehicles running on B20 biodiesel, 41 hybrid vehicles, five (5) electric vehicles, eight (8) compressed natural gas (CNG) vehicles, two (2) liquid petroleum vehicles, and 19 vehicles capable of using ethanol.

*Fleet pool and operations efficiency.* The City implemented a vehicle pool car program that encourages vehicle sharing among departments. Employee driver training has been conducted to improve fuel-efficient driving and lower vehicle maintenance and repair costs. Fleet practices resulted in a 5% reduction in fuel use for City operations in 2009-2010. Conversion to use of rerefined oil when possible for all maintenance needs reduced annual oil consumption of virgin petroleum by approximately 1800 gallons.

- ***City employee travel changes*** (City programs)

Reduction of vehicle trips by City employees both for commuting and work has reduced carbon emissions from government operations through the following actions:

*Fewer drive-alone commutes.* Drive-alone commutes by City employees were reduced by 542,000 miles in 2009-2010 through a work trip reduction incentive program of commuter benefits and bus pass programs. Employees also increased use of alternative modes when traveling to other City facilities in the performance of their work, by switching to carpooling, walking, and bicycling, and transit.

*Alternate work schedules.* Eighty-one percent of City employees work schedules that shift timing of commute travel away from the peak commute times before 8:00 a.m. and after 5:00 p.m., which lessens peak-hour congestion and associated fuel use and emissions.

*Other travel reductions:* A limited telecommuting program has been instituted for some City functions, which reduces home-work commute trips. With recent budget considerations and improvements in telecommunications options, air travel has also been limited.

- ***Electric vehicle charging stations*** (City/joint organization program)

Eight plug-in electric vehicle charging stations have been installed at City parking facilities.

### **Communitywide Measures**

- ***Downtown redevelopment & mixed use policies*** (City program)

The City has adopted a series of mixed-use (commercial-residential) land use and circulation policies over the past several decades (e.g., variable density ordinance and commercial growth limit) that have successfully encouraged redevelopment of aging existing structures and emphasized mixed-use projects in the Downtown commercial zones. These measures have assisted in the growth of alternative travel modes and in managing vehicle traffic flow.

- ***Bicycle facilities*** (City program)

The Bicycle Master Plan was adopted by the City in 1998 with goals to improve bikeway linkages between areas. Many miles of bike lanes, as well bicycle parking and other facilities have been established in the last twenty years.

- ***Pedestrian facilities*** (City program)

The City adopted a Pedestrian Master Plan in 2006 with goals and programs to increase linkages between areas and among modes of travel. More than five miles of sidewalks and other improvements have been completed in the past twenty years. The Safe Routes to School program has focused on filling in pedestrian links used by schoolchildren. The 2008 citywide traffic analysis completed for the *Plan Santa Barbara* General Plan Program Environmental Impact Report found a high level of pedestrian facilities in place and high level of walking within the community.

- ***Bus facilities and service*** (City program)

The City has contributed financially to the Metropolitan Transit District, which has supported service level and facility improvements. Shuttle bus services have also been established in areas such as the waterfront.

- ***Parking policies*** (City program)

City downtown parking programs over the past decades have supported commercial enterprise, traffic flow, and neighborhoods.

- ***Area mobility plans*** (City program)

City planning processes have taken place to address traffic and mobility issues in the Upper State Street area (2007), St. Francis neighborhood, and Oak Park neighborhood.

- ***Freeway improvements*** (City/Joint agencies programs)

Improvements instituted to Highway 101 and freeway ramps over the past decades have improved traffic flow and peak-hour traffic levels.

- ***Roadway improvements*** (City and joint agency programs)

The City has undertaken strategic roadway improvements to improve connectivity and traffic flow. Reduced street widths and fewer vehicle lanes have been incorporated to support non-vehicle modes when feasible, and with assurance of continued safety.

- ***Electric Vehicle Infrastructure*** (Joint agency program)

The City participates in the Central Coast Plug In Electric Vehicle Readiness Plan for establishing a network of charging stations to facilitate electric vehicle travel.

**TRAVEL & LAND USE: ADDITIONAL FUTURE CITY ACTIONS****City Government Operations****14. *Fleet vehicles*** (City programs; ongoing through 2030)

Continue gradual transition of City fleet to use more alternative technologies and fuels that lower carbon emissions. Continue to expand fleet operations efficiency measures, such as a program for pooling medium and heavy-duty City trucks.

**15. *City employee travel changes*** (City programs; ongoing through 2030)

Continue and expand programs to reduce City employee travel emissions, including through alternate work hours and telecommuting; and reduced commute and work-related vehicle trips through vehicle sharing, walking, bicycling, and transit.

**Communitywide Measures****16. *Mixed use land use policies*** (2011 General Plan policies; ongoing through 2030)

Implement new policies for smaller unit and density incentives to further encourage a mix of commercial and residential land uses, particularly in the City Downtown, and to encourage workforce and affordable housing close to transit and commercial services.

**17. *Sustainable neighborhood plans – travel and land use***. (City GP LG15.1; ongoing to 2030)

Develop sustainable neighborhood plans that would enhance livability and accessibility, and reduce the community's carbon footprint. The plans would include measures to address land use, circulation, and infrastructure issues, such as housing types and affordability; neighborhood-serving commercial and institutional uses; community services; transit, vehicle, bicycle, and pedestrian connectivity; open space, street tree, and landscaping improvements; and parking policies.

**18. *Experimental development techniques*** (City program; target 2015; ongoing through 2030)

Establish permitting process and development standard flexibility on a limited basis to allow new development techniques and materials that could provide reduced carbon emissions. Examples may include green roofs and straw bale construction.

**19. *Complementary land uses*** (City program; target 2020; ongoing through 2030)

As part of in-fill mixed-use development Downtown and the preparation of Sustainable Neighborhood Plans, establish provisions to facilitate complementary new uses not present (e.g., supermarkets, parks, schools), and allow local-serving businesses near employment centers (e.g., childcare, restaurants, banks, medical offices, drug stores).

**20. *Electric vehicle charging stations*** (City program; target 2015; ongoing through 2030)

Work with the business community and community interest groups to facilitate installation of a network of additional electric vehicle charging stations for improved all electric vehicle travel locally and regionally.

- a) Install additional universal electric vehicle charging stations in City-owned parking facilities.

- b) Continue to collaborate regionally to implement the Central Coast Plug In Electric Vehicle Readiness Plan, including efforts to identify regional charging station sites, coordinate with institutions, businesses, and other entities with large EV charging programs, obtain grant funding assistance, and support public education and outreach.
  - c) Establish guidelines and procedures to expedite permitting and installations of charging stations, including provisions addressing locations, equipment types, siting and station designs, installation standards, signage, fees, inspections, utility notification, and site lay-outs for multi-family and mixed-use properties. Consider including example applications and designs, on-line and phone inspection options, and plan waivers.
  - d) Consider ordinance provisions for new projects that require pre-wiring exceeding CalGreen standards to avoid the need for voltage/wiring upgrades with later installation of charging stations.
  - e) Consider designating zones and land uses appropriate for quick charging facilities (higher energy, larger stations) and slow charging facilities (lower energy, smaller stations).
  - f) Consider zone changes to require specified percentages of required parking spaces by land use type to have electric vehicle charging equipment.
- 21. Pedestrian infrastructure** (City program; GP policy C1.1; plan update 2020; ongoing to 2030)  
Continue to implement additional pedestrian facility improvements, such as sidewalk in-fills and safe routes to schools; universal access with corner curb ramps; Pedestrian Master Plan measures for crossing designs and pedestrian amenities (e.g., lighting, benches, trees, shelters, newspaper dispensers, landscaping).
- 22. Bicycle infrastructure improvements** (City program; C1.1; plan update 2015; ongoing 2030)  
Continue to implement additional Bicycle Master Plan measures (e.g., bicycle facilities on streets and public places, policies for bicyclists on major routes during peak travel periods, and funding for bike lane maintenance) and safe routes to school improvements; and coordinate with South Coast agencies to expand regional routes and paths.
- 23. Personal transportation** (Joint City/ private program; GP policy C1.2; ongoing to 2030)  
Work with business and community interest groups to establish community car sharing and bicycle sharing programs.
- 24. Intermodal connections** (City program; GP policy C1.3; ongoing to 2030)  
Continue to improve intermodal route connections and infrastructure for vehicles, public transit (buses, shuttles, rail, and taxis), car pools, carshare/bikeshare programs, bicycles, and pedestrian routes.
- 25. Optimize roadway capacity, flow and safety** (City program; GP C1.4; ongoing to 2030)  
Continue to use Intelligent Transportation System (ITS) techniques such as signal timing to optimize capacity and improve flow and safety for vehicles, pedestrians, bicycles, and buses.



- 26. *Mid-block traffic improvement and connectivity techniques*** (City program; C1.5; to 2030)  
As part of capital improvements and private development, continue to implement measures to improve mid-block traffic flow, connectivity, and alternative travel mode access, such as shared driveway access and parking; effective access design and driveway spacing; median treatment; traffic control refinement; and design of improvements for buses, pedestrians, and bicycles.
- 27. *Regional transportation and commuter transit*** (City/joint agencies; GP policy C2; to 2030)  
Continue to coordinate regionally with SBCAG, MTD, railroads, cities, counties, Caltrans, and other agencies and the private sector to improve rail, bus, and carpool options for commuters and improve energy efficiency of transportation network in conjunction with SB 375 Sustainable Communities planning. Include efforts to improve inter-county multi-modal and rail and express bus commuting, and to improve bus service headways during peak periods to five minutes on primary transit corridors. Study and pursue all feasible funding mechanisms to improve transit service.
- 28. *Vehicle speeds*** (City program; GP policy C3; target 2015)  
Advocate for legislation to promote speed limits that consider street design, adjacent land uses, and mix of travel modes used.
- 29. *Bus pull-out right of way*** (City program; GP policy C4; target 2015)  
Advocate legislation to facilitate buses in turn-out pockets merging back into traffic.
- 30. *Circulation improvements*** (City program; GP policy C6; ongoing through 2030)  
Identify intersection deficiencies, feasible improvements and funding, and install improvements.
- 31. *Transit passes*** (City/joint agency program; GP policy C6.3; ongoing to 2030)  
Establish program to require employer-paid transit passes for new development and employers, and work with regional partners to include regional bus and rail services, and provide compatible fare media.
- 32. *Parking policies*** (City program; GP policies C6.4, C6.5, C7; ongoing to 2030)  
Continue to refine parking policies to support traffic management and vehicle trip emissions reduction, including expansion of programs as supported by the community to provide an employer parking cash-out program; on-street parking pricing; changes to parking requirements for development such as parking maximums and unbundled parking; changes to downtown parking district; shared parking policies; and changes to residential parking programs.
- 33. *Car-pooling and telecommuting*** (Joint public/private program; GP policy C6.7; to 2030)  
Continue to work with public and private interests and regional partners to promote opportunities for increased carpooling and telecommuting.
- 34. *Car-sharing*** (Joint public/private program; GP policy C6.8; ongoing to 2030)  
Continue to work with public and private interests and regional partners to support establishment of car-sharing programs and facilities.

**35. *Development impact fees*** (City program; GP EF26, C1.1; target 2015)

Conduct a feasibility study toward establishing development fees to help fund circulation improvements. Consider a fee scale based on project locations, extent of mixed-use development, and extent of green space loss.

**36. *Street widths*** (City program; ongoing through 2030)

Continue to implement measures in appropriate locations to reduce street widths or vehicle lanes, while maintaining adequate emergency access, in order to manage traffic and safety and accommodate complete street improvements for pedestrian and bicycle travel.

**37. *New development vehicle emissions*** (City program; GP Policy ER1.2; target 2015)

Require new development, redevelopment and substantial remodels to demonstrate how the project will support the City in attaining regional GHG vehicular emissions reduction targets. The Santa Barbara region has targets of zero net increase (from 2005 levels) in per capita GHG vehicular emissions in 2020 and 2035. These regional targets were adopted in 2010 by the Santa Barbara County Association of Governments (SBCAG) and the California Air Resources Board (CARB) pursuant to SB 375.

**38. *Marine shipping emissions*** (City program; GP Policy ER9; ongoing through 2030).

Support regional and State efforts to reduce marine shipping emissions.

### 2.3.4 Vegetation Measures

Trees are an important factor in climate change because they remove carbon emissions from the atmosphere by photosynthesis or growth (known as carbon sequestration), as well as provide cooling shade.

The City of Santa Barbara is largely built out but includes large park areas (e.g., Parma Park, Elings Park, and Douglas Family Preserve), creek corridors, and an extensive “urban forest” of trees and vegetation within the built community. The City’s urban forest includes more than 45,000 trees along public streets and in parks and other public places, and an estimated 250,000 trees on private property. There is a long history of City policies and programs to protect and maintain trees, open space, and vegetation.

The benefit of vegetation-related measures in absorbing carbon emissions is a complicated matter however. In addition to absorbing CO<sub>2</sub>, plants also emit some CO<sub>2</sub> through respiration. Soils also release CO<sub>2</sub> emissions through decomposition of organic matter. The net amount of CO<sub>2</sub> intake versus CO<sub>2</sub> release varies for different types of vegetation and ecosystems. In general, long-lived vegetation, especially trees, provides the greatest benefit to CO<sub>2</sub> uptake because they lock up carbon in their wood. Annual plants provide little benefit to carbon sequestration because the CO<sub>2</sub> they absorb is released the same year when they die.

Some landscape maintenance practices may promote CO<sub>2</sub> releases as well as other greenhouse gases such as methane or nitrous oxide, such as activities involving disturbance and erosion of soils, some fertilizer and irrigation practices, and handling of trimmings and yard waste. Use of powered lawn and garden equipment also contributes to carbon emissions. As such, landscape management practices need to consider both CO<sub>2</sub> uptake and potential gas releases to achieve a balance of greenhouse gas reduction. As an example, in areas using reclaimed water, which is higher in nitrogen, less nitrogen fertilizer is needed for the plants, and to avoid high nitrous oxide releases. Protection of established older trees may generally provide more climate benefit than replacement with new tree plantings.

**Santa Barbara General Plan Excerpts  
VEGETATION GOALS AND POLICIES**

**Conservation Element**

Visual Resources Goal. Maintain the scenic character of the City by preventing unnecessary removal of significant trees and encouraging cultivation of new trees.

Visual Resources Policy 4.0. Trees enhance the general appearance of the City’s landscape and should be preserved and protected. 4.1 Mature trees should be integrated into project design rather than removed. 4.2. All feasible options should be exhausted prior to the removal of trees. 4.3 Major trees removed as a result of development or other property improvement shall be replaced by specimen trees on a minimum one-for-one basis. 4.4. Private efforts to increase the number of street trees throughout the City should be encouraged.

Biological Resources Goal. Enhance and preserve the City’s critical ecological resources in order to provide a high-quality environment necessary to sustain the City’s ecosystem.

Policy 4.0. Remaining Southern Oak Woodlands shall be preserved, where feasible.

**Figure 2-11**

The urban heat island effect refers to higher overall temperatures in urbanized areas than rural areas because materials such as concrete and asphalt, particularly with darker colors, absorb more heat than vegetation. This effect may be counteracted to some extent by using light or reflective materials in building (e.g. “cool roofs”) and paving, and increasing use of permeable and vegetated surfaces rather than paving. Green roofs (i.e. vegetated) also have benefits to climate protection from storm water detention (less water treatment and energy use) and providing a thermal insulation layer (less energy for heating and cooling).

Trees and vegetation have other benefits beyond climate change, including air and water cleansing; habitat and food chain support; watershed and erosion protection; open area and visual aesthetics to balance with urban built areas; mental and physical health and quality of life; recreation; education and scientific/medical research; and the intrinsic value of flora.

### **Community activities**

There have been many activities over time within the Santa Barbara community by private organizations, individuals, businesses, and institutions to provide and preserve trees and vegetation. Examples include:

- *Santa Barbara Beautiful.* This community organization finances the planting of street trees in Santa Barbara from private donations and fundraising. By planting 300 or more trees each year, their efforts have totaled more than 12,000 street trees planted since 1997. Their cooperative efforts with the City Parks and Recreation Department have resulted in the City of Santa Barbara earning the National Arbor Day Foundation designation of Tree City USA for more than 31 consecutive years.
- *Private property trees and landscaping.* Tree and landscape installation and maintenance by private citizens and businesses throughout Santa Barbara is a primary component of the City’s urban forest.
- *Community funding organizations.* Community organizations such as Fund for Santa Barbara, Santa Barbara Foundation, Trust for Public Lands, Pearl Chase Society, and others have funded projects for tree, habitat, and landscape preservation and restoration.

### **City activities**

Following are descriptions of existing City programs and identified future strategies for reducing carbon emissions in City government operations and in the Santa Barbara community through preservation and addition of trees and other vegetation.

### VEGETATION: EXISTING CITY ACTIONS IN PLACE

#### Communitywide Measures

- ***Parks, landscape, and tree maintenance*** (City program)  
The City provides maintenance for more than 50 park and open space areas covering more than 1,500 acres, as well as more than 45,000 street trees.
- ***Tree replacement program***. The City loses an average of 150 trees per year. Parks Department policy is to continue tree replacement by planting a minimum of 150 trees annually to replace those lost.
- ***City street tree master plan and outreach program*** (City program)  
In the past five years, the City has completed a comprehensive inventory of City street and park trees, and expanded community education and outreach programs.
- ***City tree preservation policies and landscape guidelines*** (City program)  
The City has adopted General Plan Conservation Element policies, ordinance provisions, design review guidelines, and permitting requirements for tree preservation and landscape maintenance that protect specified trees and landscaping from removal or excessive pruning. The provisions apply to trees in front yards and public rights-of-way including parkways along roads; historic and specimen trees; trees and vegetation in hillside areas and on steep slopes, within 50 feet of creeks, near coastal bluffs, or involving native biological habitats; trees and vegetation in historic or design districts or on historic properties; and landscaping approved as part of a plan or condition of approval for a new development.
- ***Creeks restoration*** (City program)  
Over the last decade, the City has undertaken numerous creek restoration projects that help to preserve creekside trees, vegetation, and open spaces. Project examples include Bohnett Park/Old Mission Creek; Arroyo Burro Estuary/Mission Creek; Upper Las Positas Creek; and Lower Mission Creek Restoration; and replanting efforts at Sycamore Creek/Cacique, Mission Creek/Vernon Road, San Roque Creek/Stevens Park, Sycamore Creek/Liberty Street.

### VEGETATION: ADDITIONAL FUTURE CITY ACTIONS

#### Communitywide Measures

39. ***Tree planting*** (City program; target 2030)  
Increase carbon sequestration through the planting of additional trees, with a goal of 1,000 new trees by 2030.
40. ***Street trees*** (City program; target plan update 2015; ongoing through 2030)  
Update the Street Tree Master Plan to establish and implement measures addressing management and community objectives for long-term tree preservation and maintenance, and effectively allocate resources. Issues to be addressed would include canopy cover, land uses, infrastructure constraints, environmental resources, and aesthetics.

**41. Tree and landscaping protection** (City program; GP policies ER11-11.3; target 2015, ongoing)

Protect and maintain native and other urban trees and landscaped spaces, and promote the use of native or Mediterranean, drought-tolerant species in landscaping to save energy and water, incorporate habitat, and provide shade.

- (a) Update ordinance provisions to protect native oaks and other native or exotic trees. New development shall be sited and designed to preserve existing mature healthy native and non-native trees to the maximum extent feasible.
- (b) Site new development outside of oak woodlands to the maximum extent feasible. Within and adjacent to oak woodlands:
  - Avoid removal of specimen oak trees;
  - Preserve and protect oak saplings and native understory vegetation within areas planned to remain in open space;
  - Provide landscaping compatible with continuation/enhancement of the habitat area, consisting primarily of native species and excluding use of invasive non-native species;
  - Include conditions of approval for habitat restoration of degraded oak woodlands where such development creates direct or indirect impacts to the affected habitat;
  - Minimize or avoid installation of high water use landscaping under the drip lines of oak trees.
- (c) Create a citywide enforcement and mitigation program for removal, severe pruning without a permit, or neglect, of protected trees (street trees, trees in front yards, and historic or otherwise designated trees).

**42. Urban heat island effect** (City program; GP policy ER1.3; target 2020)

Reduce the urban heat island effect by establishing standards to decrease impermeable surfaces and building areas relative to lot size; providing incentives such as expedited permitting for building projects that incorporate cool roofs and green roofs; and coordinating with the Fire Department and Transportation Division to establish any appropriate changes to roadway standards to allow more permeable surfaces.

**43. Regional open space preservation** (City/joint agency program; GPU OP2.3; ongoing to 2030)

Coordinate with the County of Santa Barbara, School District, and recreational service providers of the cities of Goleta and Carpinteria on regional open space protection in the Las Positas Valley, foothills, and other areas determined appropriate.

### 2.3.5 Waste Reduction Measures

Methane is generated from landfills and wastewater treatment plants when wastes decay. A very potent greenhouse gas (about ten times stronger than carbon dioxide), methane accounts for about one percent of California's total greenhouse gas emissions. Methane capture for energy use or flaring can reduce these emissions.

Disposal of manufactured products as solid waste reflects the loss of the intrinsic energy value of products due to multiple phases of manufacturing, including raw materials extraction and processing, and product manufacturing and transport. Further energy use and emissions are then required to manufacture replacement products. Diverting materials from waste disposal through reuse, recycling, and composting reduces the energy use and emissions associated with product manufacturing and transport.

California legislation in 1989 (Assembly Bill 939 - Integrated Waste Management Act) required that all cities and counties divert 50% of solid waste generated annually from landfill disposal by the year 2000 through source reduction, recycling, and composting. The city of Santa Barbara community met that State objective through a variety of reuse and recycling programs. Subsequent State legislation Senate Bill 1016 (2007) establishes an objective for further reduction of per capita waste diversion rates. Additional progress will be needed on the diversion rate of trash collected at the curbside within the city of Santa Barbara, which now averages about 40%.

These measures also benefit the community by extending the life of landfills and potentially reducing and deferring the high cost of establishing additional disposal facility capacity and associated increases to collection fees; and by conserving energy resources and reducing dependence on foreign oil.

#### Community activities

Actions by private community members, organizations, and businesses have been the key to substantial progress in reducing and diverting waste in Santa Barbara. Here are a few examples:

- *Marborg recycling facility.* Establishment of the Marborg facility within the City has provided greatly increased local recycling capacity. City contracting for waste hauling and recycling pick-up has provided for increased recycling.
- *Reuse and recycled materials stores:* Establishment of local stores such as the Habitat for Humanity store and Living Green have provided access to used construction materials for re-use and materials made from recycled materials.

**Santa Barbara General Plan Excerpts  
WASTE REDUCTION POLICY**

**Safety and Public Services Element – Waste Reduction**

Policy PS8. Solid Waste Management Programs. Continue and expand City recycling programs for resource reduction, reuse, and recycling of solid waste.

**Figure 2-12**

## City activities

Following are descriptions of existing City programs and identified future waste management strategies for reducing carbon emissions in City government operations and the community.

### WASTE REDUCTION: EXISTING CITY MEASURES IN PLACE

#### City Government Operations

- **City solid waste program** (City Program; City Solid Waste Strategic Plan)  
Instituted numerous changes to City government operations to reduce waste and divert waste from landfill disposal, including: installed more than 600 standard small trash and large recycling containers; policies for reduced printing, increased use electronic documents, and double-sided printing; policies for purchase of recycled paper and other products; composting operations; zero waste meetings and events. Currently there is an estimated 20% diversion rate overall by all City facilities, with one-fifth of City facilities at 66% diversion or better.
- **City facilities mixed use recycling** (City program)  
Comprehensive recycling programs established at ten City facilities.  
**Airline terminal waste management** (City program; Airline Terminal Solid Waste Plan)  
Educational outreach and training on solid waste program was provided to terminal tenants to minimize solid waste generation.
- **Former Las Positas landfill** (City program)  
Flare established for methane at Elings Park.

#### Communitywide Measures

- **Regional waste diversion** (Multi-Jurisdictional Solid Waste Task Group; City Strategic Plan)  
City implementation of identified regional programs to expand diversion of waste from landfill disposal through commercial recycling, electronic waste collection, household hazardous waste collection, food waste collection and processing, and construction/demolition waste recycling. Coordination on initial steps toward establishment of a regional resource recovery facility as an alternative to landfill disposal.
- **Community solid waste program** (City program; City Solid Waste Strategic Plan)  
Installed more than 500 recycling containers on city sidewalks and in parks; public outreach includes service announcements and *Looking Good Santa Barbara* program that bestows service awards on community members that reduce waste.
- **Business recycling program** (City program)  
Provided lower collection rate incentive for business recycling and composting.
- **Construction/demolition waste** (City program; City Strategic Plan)  
Established City ordinance requiring recycling of construction/demolition debris.



- ***Foodscrap composting program*** (City program)  
Instituted program for 155 businesses, including Santa Barbara and Hope School Districts, Santa Barbara City College, Cottage Hospital, hotels, and restaurants.
- ***Single-use bag reduction*** (City/business/interest group joint program)  
Undertook a public educational outreach and voluntary program to encourage use of reusable bags when making purchases, together with Santa Barbara Channelkeeper, Choose to Reuse, California Grocery Association, Tri-County Produce, and grocery stores.

#### WASTE REDUCTION: ADDITIONAL FUTURE CITY ACTIONS

##### City Government Operations

- 44. *City business purchasing guidelines*** (City program; GP Policy PS8.5; target 2015)  
Amend City procurement guidelines to increase use of goods made from re-used materials in City government operations.
- 45. *City facilities recycling*** (City program; target 2015)  
Establish additional comprehensive recycling programs at City facilities with the target of reaching overall City operations waste diversion rate of 50% by 2015 and 60% by 2020.
- 46. *Electronic processes*** (City program; target 2014)  
Increase City processes done electronically to reduce printing. These will include more use of scanning and email technology to reduce printing of legal documents; and coordinating an electronic campaign filing system for candidates, committees, and elected officials.
- 47. *City coordination with region*** (City program; through 2020)  
Continue coordination with Santa Barbara County and other cities in solid waste planning.

##### Methane Reduction

- 48. *Waste-to-energy facility at landfill*** (County/City program; GP Policy PS8.4; target 2015)  
Continue to partner with the County of Santa Barbara and other participating South Coast agencies in establishing a waste-to-energy conversion technology facility at Tajiguas Landfill.

##### Communitywide Reduced Waste Disposal and Increased Recycling

- 49. *Communitywide waste diversion goal*** (City program; target 2020)  
Achieve 75% overall waste diversion from landfill disposal by 2020 through waste reduction, reuse, recycling, and composting.
- 50. *Regional material recovery facility*** (County/City program; City Strategic Plan; target 2015)  
Continue pursuing the establishment and operation of regional MR facility on South Coast.
- 51. *Waste audit information for businesses*** (City programs; GP Policy PS8.5; target 2015)  
Continue conducting commercial business waste audits with the Green Business Program.

**52. Recycling education campaigns** (City program; GP Policy PS8.5; target 2015)

Continue to develop recycling outreach education and incentive programs to highlight the economic and environmental benefits of recycling.

**53. Single-use materials and packaging reduction** (City program; GP Policy PS8.5; target 2015)

Consider City ordinance options to discourage single-use materials and reduce packaging.

**54. Business and multi-family sector recycling ordinance** (City program; GP Policy PS8.5; 2015)

Develop a City ordinance requiring recycling in the business and multi-family residential sectors to achieve compliance with AB 341 legislation.

**55. Construction waste hauling program enforcement** (City program; GP Policy PS8.5; 2015)

Increase monitoring and enforcement of City Unscheduled Hauling Ordinance to ensure that most construction debris is recycled.

**56. Increased recyclables sorting** (City program; GP Policy PS8.5; target 2015)

Pursue increased waste diversion capture through increased sorting, via waste management contracts or the regional resource recovery facility project.

**57. School waste diversion** (City/District program; target 2015)

Continue City program with district schools to establish mixed recyclables and food scrap collection programs at Santa Barbara high schools and junior high schools.

**58. Materials reuse & recycling information for builders** (City program; GP PS8.2; target 2015)

Establish data/outreach to connect builders to outlets for salvage/recycled building materials.

**59. Building space guidelines for waste management** (City program; GP Policy PS8.3; 2015)

Revise the City's Space Enclosure Guidelines for new building to provide additional space for recycling, green waste, and food scrap collection.

**60. Additional recycling materials** (City program; GP Policy PS8.5; target 2020)

Pursue measures to add more materials to recycling and organics diversion (e.g., textiles, wood, and film plastics).

**61. Additional greenwaste capacity** (City program; target 2020)

Undertake measures to increase local greenwaste capacity.

**62. Additional recycling in public places** (City program; target 2020)

Install additional recycling containers in public parks and streets.

**63. Additional composting** (City program; target 2020)

Coordinate with public and private entities to increase composting.

**64. Single-use bag reduction** (City program; target 2015)

Participate in regional environmental analysis with BEACON (Beach Erosion Authority for Clean Oceans and Nourishment) and other South Coast agencies, and implement an ordinance to regulate the distribution of single-use bags by retailers in the City.

### 2.3.6 Water Conservation Measures

Water supply facilities utilize energy for water transport and processing. The State Water Project is the largest single user of electricity in California, particularly because of large energy requirements for pumping water over mountains. Local water processes involve relatively less intensive energy use, but cumulatively it is substantial.

Water conservation measures are associated with electricity savings and resulting carbon emissions reductions. It is anticipated that plumbing upgrades and appliance standards will provide substantial reduction in water demand by both existing and new development in the coming decades.

In addition to benefits for climate protection, water conservation benefits the community with lower costs and more options for supplying water needs, lowered energy use, and less dependence on foreign oil.

#### **Santa Barbara General Plan Excerpts WATER CONSERVATION POLICIES**

Goal. Present and Future Service Needs. Ensure that public infrastructure and services are planned, sited, upgraded, and maintained to meet present and future service needs efficiently, economically and in a manner consistent with a sustainable community and climate change.

Policy PS5. Analysis of Water Savings. As part of the Long Term Water Supply Program update, perform a comprehensive analysis of water savings from specific conservation measures, including a cost benefit analysis, to determine which potential new water conservation measures will be most feasible and cost effective for the City to pursue. The City shall incorporate identified measures into the water conservation component of the LTWSP update. *[Note: This measure was completed in 2011 with the LTWSP update.]*

Policy PS6. Water Conservation Program. The use of water conservation practices shall be both encouraged and required, as appropriate, for all development projects.

**Figure 2-13**

### Community activities

There have been many efforts to conserve water use and reduce associated energy use by individuals, businesses, and institutions in Santa Barbara over the past several decades through measures such as installation of water-conserving plumbing and irrigation equipment; use of drought-tolerant landscaping; and reduced water use practices. Here are a few examples:

- *Water-conserving public demonstration gardens.* Gardens with examples of low-water use plantings, irrigation, and composting systems, along with public outreach and education, have been established by a number of institutions in Santa Barbara, including Santa Barbara City College and the Santa Barbara Botanic Gardens.
- *Utility upgrade programs.* Southern California Edison and Southern California Gas Company have instituted energy conservation rebate and assistance programs that include upgrades for high-efficiency clothes washers and low-flow showerheads that also conserve water.

- *Allen Associates residential development.* Dennis Allen was named the City of Santa Barbara's first Water Hero for his Victoria Garden Mews project of four condominium units. The project incorporates both indoor and outdoor water-efficient features. High-efficiency appliances are used (washing machines, faucets, toilets). The courtyard garden of fruit trees, vegetables, and drought-tolerant and native plants is irrigated with rainwater directed into filtrated roof gutters and to basement storage. The front lawn is UC Verde Buffalograss, a species that uses 70% less water than traditional lawns and requires little mowing, and the lawn is irrigated with a subsurface drip system.
- *City College plumbing upgrades.* City College replaced more than 100 toilets with high-efficiency, water-conserving models (1.28 gallons/flush).

Even with a gradual increase in population and employees, the city of Santa Barbara community has reduced its overall water use by more than 2,000 acre-feet per year (AFY) in the last two-decade period since an extended drought occurred in the late 1980's and early 1990's.

### City activities

The following summarizes City activities already undertaken or in place, and future City strategies toward further water conservation in government operations and the community.

#### WATER CONSERVATION: EXISTING CITY MEASURES IN PLACE

##### City Government Operations

- ***Water conserving equipment and practices*** (City program)  
The City has retrofitted City facilities with water-conserving equipment such as high-efficiency toilets, waterless urinals, and low-flow showerheads, as well as water wise landscaping. Irrigation systems at City facilities and parks continue to upgrade with more efficient equipment, smart irrigation controllers, and rain sensors. Water-conserving practices have also been put into place for City facilities and landscape maintenance activities (including Water Conservation Requirements for New Construction and Renovations at City Facilities). Recycled water is used at City parks and the golf course for irrigation and toilet flushing.
- ***Water loss control*** (City program)  
The City audits water balance annually; the City water systems unaccounted loss is less than 10%. Water main conditions are tracked and replacement needs prioritized. The City replaces about three miles per year of the 275 mile system of water mains.
- ***California irrigation management information system (CIMIS)*** (City/State program)  
CIMIS is a network of weather stations that read and collect information on wind, vapor pressure, air temperature, relative humidity, dew point, solar radiation, soil temperature, and precipitation. The information is transmitted to a central computer data base that gives daily evapotranspiration rates that can be accessed on DWR's website to assist in efficient irrigation practices. Two CIMIS weather stations are owned by the California Department of Water Resources (DWR) and located at the City Golf Course and Vic Trace Reservoir. City staff assists in maintenance of the stations.

### **Communitywide Measures**

- ***City water conservation plans and policies*** (City programs)

City water management plans, policies, and programs have long reflected a commitment to water conservation along with the management of diversified water supply sources. The current Long-Term Water Supply Plan (2011) sets a water conservation policy for the period to the year 2030 as follows: *“The City will operate a water conservation program aimed at minimizing the use of potable water supplies, meeting the requirements of the California Urban Water Conservation Council Best Management Practices, and achieving compliance with 20 x 2020 per capita water use limitations.”* [Note: 20 x 2020 refers to the State legislative objective of reducing per capita water use by 20% by 2020.]

- ***Santa Barbara County integrated regional water management program*** (Joint agencies)

The IRWMP is a coordinated effort of the Santa Barbara County Water Agency together with cities including the City of Santa Barbara, special districts, and water companies within the County to promote and practice integrated regional water management strategies toward sustainable water use, reliable water sources, water quality, environmental stewardship, efficient development, protection of agriculture, and watershed awareness. Priorities identified in the proposed 2012 Plan update include measures to increase conservation and efficiency of water use.

- ***Ordinance provisions for water conservation, landscaping, recycled water*** (City program)

City ordinance provisions are in place to provide for water-conserving plumbing standards; required findings for water supply and conservation for new development permits; compliance with adopted landscape design standards for water conservation; water use conservation regulations during declared drought conditions; and required use of recycled water for irrigation when available..

- ***Rain shut-off sensors*** (City program)

This City program provides free rain shut-off sensors that stop a sprinkler timer from watering during and after a rain event. A sensor reduces winter water use and water bills by an estimated average of 16%.

- ***Landscape rebate program*** (City program)

Provides rebates for installation of water-efficient irrigation equipment, water wise plants, mulch, smart irrigation controllers, and laundry-to-landscape gray water systems (up to \$1,000 for residential, \$4,000 for commercial or homeowners associations).

- ***Water evaluations*** (City program)

Provides residential, business, and irrigation water use evaluations and recommendations for improved efficiency measures and upgrades.

- ***Water-wise landscape guidance*** (City programs and joint-agency programs)

Internet information programs have been established including water-wise plants appropriate for the local climate, and a landscape water budget program. The Landscape Watering Calculator tool helps estimate the right amount of water to give a landscape and identifies a weekly irrigation schedule based on location, plant types, soil type, and sprinkler type. The

Watering Index provides settings for irrigation controllers to adjust weekly water schedules based on seasonal weather changes. A Green Gardener program (sponsored by City, County, other cities and water districts) has trained more than one thousand certified green gardeners in Santa Barbara County.

- ***Grey water and rainwater collection guidelines*** (City program)

Reuse of wastewater from showers and clothes washers for landscape irrigation is permitted under California Plumbing code provisions, and the City provides educational information, a permitting guide, and design examples. Information is also provided about rainwater harvesting and use of rain barrels.

- ***Public information*** (City programs and joint agency programs)

City public education and outreach programs include a water conservation hotline for questions and scheduling water check-ups; a City water conservation website ([www.SaveWaterSB.org](http://www.SaveWaterSB.org)); promotion of the regional water conservation website ([www.sbwater.org](http://www.sbwater.org)) and free Water Wise Gardening in Santa Barbara County compact disc; water conservation brochures and handouts on indoor water conservation, efficient irrigation, and sustainable landscaping; videos on water conservation, sustainable landscaping, and efficient irrigation available for loan to the public; and an annual media campaign in conjunction with the Santa Barbara County Water Agency and water purveyors.

- ***School education*** (City programs)

Water education programs are given in approximately 90 class and summer camps per year. Water education materials are provided to schools and tours of City water treatment facilities with free bus service are provided. The City participates in the Annual Water Awareness high school video contest and Santa Barbara County Science Fair with a special award on water awareness.

## WATER CONSERVATION: ADDITIONAL FUTURE CITY ACTIONS

### **City Government Operations**

#### **65. City facilities** (City program; ongoing through 2030)

Continue implementing City policies for water-conserving equipment upgrades and practices at City government facilities. Implement additional facility, landscape, and procedure improvements to further conserve water as identified and determined feasible.

### **Communitywide Measures**

#### **66. Community water conservation** (City program; LTWSP and GP PS6.1; ongoing through 2030)

Continue and expand City water conservation measures as identified in the City Long Term Water Supply Plan (2011), including services to water customers, public information and education, landscape design standards, building standards, and regional coordination. The year 2020 water use reduction target for the Santa Barbara community is to reduce 20% per capita water use from the prior baseline level of 154 gallons per capita per day (GPCD) to 117

GPCD in 2020. The 2009 level for the City was 130 GPCD. Actions to further encourage or require water conservation may include the following:

- (a) *Marketing plan.* Continue and expand efforts, such as establishment of water wise landscape and homeowner association recognition programs; enhance outreach materials including dual-language communications materials for gardeners; continue and enhance water wise gardening workshops, gardening tours, and school programs.
- (b) *Green building design.* Work with local Green Building associations, City Building Division, developers, designers, vendors to promote incorporating water efficiency into building design.
- (c) *Commercial/industrial evaluation and incentives.* Establish program to offer free water survey and evaluation by trained technical professional to 100 highest water user accounts (such as hotels, laundries, etc.). Follow-up communication would be provided on recommended measures for the business to save water and money, and City financial incentives may be offered based on cost/benefit analysis and as City funding sources allow.
- (d) *Free mulch.* Establish a City subsidy for delivery charges for mulch obtained free from the local sources. Use of mulch benefits water savings by keeping irrigation or storm water on site and reducing run-off and evaporation.
- (e) *Toilet retrofits prior to building sales.* To coincide with California state law Senate Bill 407, establish a program in 2017 (residential) and 2019 (commercial) to work with the real estate industry to require a certificate of compliance be submitted to the City that efficient fixtures are in place or installed at the time of sale prior to close of escrow. Consider allowing this certification to be made as part of the conventional private building inspection report process.

**67. Recycled water** (City program; LTWSP and GP PS6.2; target 2030)

Per the Long Term Water Supply Program to the year 2030, continue to expand existing City programs for use of recycled water for irrigation at parks, schools, golf courses, and new development near supplies, targeting 300 acre-feet/year (AFY) expansion for a total of 1,100 AFY. Evaluate methods to optimize the feasible use of recycled water in place of potable water. Work towards reducing or eliminating the need for blending potable water with recycled water, based on economic, regulatory, and water supply requirements.

**68. On-site water storage and reuse** (City program; GP PS6.3; target 2020)

Identify more detailed guidelines for use of cisterns and grey water in new development and for retrofitting existing development.





## 2.4 Effectiveness of Strategies

Forecasts of carbon emission reductions with implementation of plan strategies are provided below for years 2020 and 2030, followed by a comparison with emission reduction targets.

### 2.4.1 *With Plan* forecasted emissions reduction in 2020 and 2030

Estimating future carbon emission reductions for the plan strategies entails use of a variety of data, trends, and assumptions, provided in more detail in Appendix B.

The following Figure 2-14 provides a summary of forecasted annual citywide emissions levels with implementation of the climate plan in the target years of 2020 and 2030.

The subsequent Figure 2-15 provides a breakdown of annual emissions reduction for each plan measure in the target years of 2020 and 2030. Some measures are identified as best management practices (BMP) and are expected to provide emissions reduction but no specific reduction level is calculable. Some measures are accounted for through the traffic model used for projecting future vehicle trips and are not identified in the table to avoid double counting.

**Figure 2-14 *WITH PLAN* FORECASTED CITYWIDE CARBON EMISSIONS FOR 2020 AND 2030**

	2020 With Plan Annual MTCO <sub>2</sub> e	2030 With Plan Annual MTCO <sub>2</sub> e
<b>Scope 1 Emissions</b> (direct emissions within City)		
On-Road Vehicle Emissions	285,059	175,254
<i>Per Capita On-Road Vehicle Emissions</i>	<i>3.096/person</i>	<i>1.843/person</i>
Off-Road Vehicle/Equipment Emissions	41,209	42,572
<i>Per Capita Off-Road Vehicle/Equipment Emissions</i>	<i>0.448/person</i>	<i>0.448/person</i>
Natural Gas Consumption Emissions	117,892	116,531
<i>Per Capita Natural Gas Consumption Emissions</i>	<i>1.281/person</i>	<i>1.225/person</i>
Las Positas Landfill Decomposition Emissions	3,045	1,847
<i>Per Capita Las Positas Decomposition Emissions</i>	<i>0.033/person</i>	<i>0.019/person</i>
<b>Subtotal Scope 1 Emissions</b>	<b>447,205</b>	<b>336,204</b>
<b><i>Per Capita Scope 1 Emissions</i></b>	<b><i>4.858/person</i></b>	<b><i>3.535/person</i></b>
<b>Scope 2 Emissions</b> (outside City; energy)		
Electricity Consumption in City Emissions	92,972	88,878
<i>Per Capita Electricity Consumption in City Emissions</i>	<i>1.010/person</i>	<i>0.934/person</i>
State Water Project Electricity Emissions	722	722
<i>Per Capita State Water Project Electricity Emissions</i>	<i>0.008/person</i>	<i>0.008/person</i>
<b>Subtotal Scope 2 Emissions</b>	<b>93,694</b>	<b>89,600</b>
<b><i>Per Capita Scope 2 Emissions</i></b>	<b><i>1.018/person</i></b>	<b><i>0.942/person</i></b>
<b>Scope 3 Emissions</b> (outside City; misc./lifecycle)		
Tajiguas Landfill - <b>Subtotal Scope 3 Emissions</b>	<b>2,305</b>	<b>2,399</b>
Tree Planting (Climate Plan Measure #39)	<b>-18</b>	<b>-35</b>
<b><i>Per Capita Scope 3 Emissions</i></b>	<b><i>0.025/person</i></b>	<b><i>0.025/person</i></b>
<b>TOTAL EMISSIONS</b>	<b>543,185</b>	<b>428,167</b>
<b><i>Total Per Capita Emissions</i></b>	<b><i>5.900/person</i></b>	<b><i>4.502/person</i></b>

**Figure 2-15 Forecasted Citywide Emissions Reductions from Climate Plan Strategies**

<b>Climate Plan Strategies</b>	<b>Emissions Reduction 2020 Annual MTCO<sub>2</sub>e</b>	<b>Emissions Reduction 2030 Annual MTCO<sub>2</sub>e</b>
<b>ENERGY EFFICIENCY AND GREEN BUILDING MEASURES</b>		
<b>City Government</b>		
1. Energy-efficient City facilities	318	581
2. Recreational field lighting efficiency projects	16	16
<b>Community</b>		
3. Energy-efficient buildings – voluntary actions	3,992	9,816
4. Energy-efficient buildings – further outreach incentives, requirements	334	3,270
5. Green building	BMP	BMP
<b>SUBTOTAL – Energy Efficiency and Green Bldg</b>	<b>4,660</b>	<b>13,683</b>
<b>RENEWABLE ENERGY MEASURES</b>		
<b>City Government</b>		
6. Hydroelectric plant re-commissioning	233	233
7. Solar photovoltaic project at Airport parking	167	167
<b>Community</b>		
8. Community choice aggregation	20,101	20,101
9. Alternative/advanced fuels	48,811	85,560
10. Incentives - alternative fuel infrastructure		
11. Small wind generators	24	60
12. Facilitate renewable energy technologies	167	334
13. Solar energy	996	3,287
<b>SUBTOTAL – Renewable Energy - Electricity</b>	<b>21,688</b>	<b>24,182</b>
<b>SUBTOTAL – Renewable Energy - Fuel</b>	<b>48,811</b>	<b>85,560</b>
<b>TRAVEL AND LAND USE MEASURES</b>		
<b>City government</b>		
14. Fleet vehicles	242	484
15. City employee travel changes	200	345
<b>Community</b>		
16. Mixed use land use policies	Addressed in traffic model	Addressed in traffic model
17. Sustainable neighborhood plans	Addressed in traffic model	Addressed in traffic model
18. Experimental development techniques	BMP	BMP
19. Complementary land uses	Addressed in traffic model	Addressed in traffic model
20. Electric vehicle charging stations	1,967	3,018
21. Pedestrian infrastructure	327	584
22. Bicycle infrastructure improvements	905	1,735
23. Personal transportation	2,616	2,919
24. Intermodal connections	1,967	1,886

**Figure 2-15 Forecasted Citywide Emissions Reductions from Climate Plan Strategies (continued)**

<b>Climate Plan Strategies</b>	<b>Emissions Reduction 2020 Annual MTCO<sub>2</sub>e</b>	<b>Emissions Reduction 2030 Annual MTCO<sub>2</sub>e</b>
25. Optimize roadway capacity, flow, and safety	7,867	15,090
26. Mid-block traffic improvement & connectivity	BMP	BMP
27. Regional transportation and commuter transit	4,284	7,974
28. Vehicle speeds	BMP	BMP
29. Bus pull-out right of way	BMP	BMP
30. Circulation improvements	BMP	BMP
31. Transit passes	2,927	5,449
32. Parking policies	31,466	69,973
33. Car-pooling and telecommuting	3,570	4,984
34. Car-sharing	1,118	1,990
35. Development impact fees	BMP	BMP
36. Street widths	BMP	BMP
37. New development vehicle emissions	BMP	BMP
38. Marine shipping emissions	BMP	BMP
<b>SUBTOTAL – Travel and Land Use</b>	<b>59,456</b>	<b>116,431</b>
<b>VEGETATION AND OPEN SPACE MEASURES</b>		
<b>Community</b>		
39. Tree planting	18	35
40. Street trees	BMP	BMP
41. Tree and landscaping protection	BMP	BMP
42. Urban heat island effect	806	1,612
43. Regional open space preservation	BMP	BMP
<b>SUBTOTAL – Vegetation and Open Space</b>	<b>824</b>	<b>1,647</b>
<b>WASTE REDUCTION MEASURES</b>		
<b>City government</b>		
44. City business purchasing guidelines	BMP	BMP
45. City facilities recycling	BMP	BMP
46. Electronic processes	BMP	BMP
47. City coordination with region	BMP	BMP
<b>Methane reduction</b>		
48. Waste-to-energy facility at landfill	533	533
<b>Community</b>		
49. Communitywide waste diversion goal	1,121	1,158
50. Regional material recovery facility	BMP	BMP
51. Waste audit information for businesses	BMP	BMP
52. Recycling education campaigns	BMP	BMP
53. Single-use materials and packaging reduction	BMP	BMP
54. Business and multi-family recycling ordinance	BMP	BMP
55. Construction waste hauling enforcement	BMP	BMP
56. Increased recyclables sorting	BMP	BMP

**Figure 2-15 Forecasted Citywide Emissions Reductions from Climate Plan Strategies (continued)**

<b>Climate Plan Strategies</b>	<b>Emissions Reduction 2020 Annual MTCO<sub>2</sub>e</b>	<b>Emissions Reduction 2030 Annual MTCO<sub>2</sub>e</b>
57. School waste diversion	BMP	BMP
58. Materials reuse and recycling info for builders	BMP	BMP
59. Building space guidelines for waste Management	BMP	BMP
60. Additional recycling materials	BMP	BMP
61. Additional green waste capacity	BMP	BMP
62. Additional recycling in public places	BMP	BMP
63. Additional composting	BMP	BMP
64. Single-use bag reduction	BMP	BMP
<b>SUBTOTAL – Waste Reduction</b>	<b>1,654</b>	<b>1,691</b>
<b>WATER CONSERVATION MEASURES</b>		
<b>City Government</b>		
65. City facilities	1	2
<b>Community</b>		
66. Community water conservation	1,329	1,539
67. Recycled water	BMP	BMP
68. On-site water storage and reuse	138	208
<b>SUBTOTAL – Water Conservation</b>	<b>1,468</b>	<b>1,749</b>
<b>TOTAL REDUCTION – CLIMATE PLAN MEASURES</b>	<b>138,561</b>	<b>244,943</b>
Percent Reduction	20%	36%
<b>EMISSIONS AFTER REDUCTION</b>	<b>543,185</b>	<b>428,167</b>
Forecasted population	92,064	95,110
<b>Per Capita Emissions</b>	<b>5.90</b>	<b>4.50</b>

### 2.4.2 Plan comparison to carbon emissions targets

Figure 2-16 below compares forecasted *With Plan* citywide carbon emissions with year 2030 and 2030 targets.

With implementation of Plan strategies, future citywide carbon emissions are forecasted to continue reducing and would surpass the AB 32 total emissions target, at 25% below the 1990 level in 2020. Per capita vehicle emissions are forecasted to surpass the SB 375 target for Santa Barbara County, at 30% below the 2005 level in 2020 and 58% below the 2005 level in 2030.

**Figure 2-16 Comparison of *With Plan* emissions forecasts to 2020 and 2030 targets**  
(metric tons carbon dioxide equivalents MTCO<sub>2</sub>e)

City of Santa Barbara Emissions Targets	Citywide Emissions Forecasts with Climate Plan Implementation
<b>Total citywide annual emissions (2020 target)</b>  1990 level of total annual citywide carbon emissions, per the State AB 32 target. [1990 level estimated at <u>724,389 MTCO<sub>2</sub>e</u> ]	With Climate Plan implementation, total annual carbon emissions generated within the City of Santa Barbara community are forecasted to be <u>543,185 MTCO<sub>2</sub>e</u> in 2020, 25% lower than the 2020 reduction target.
<b>Annual per capita vehicle emissions (2020 and 2030 targets)</b>  2005 level of annual per capita carbon emissions from passenger vehicle and light truck travel, per the SB 375 State and regional County target. [estimated at <u>4.413 MTCO<sub>2</sub>e/person</u> ].	With Climate Plan implementation, citywide per capita annual carbon emissions from passenger vehicles and light trucks are forecasted to be <u>3.096 MTCO<sub>2</sub>e/person</u> in 2020 and <u>1.843 MTCO<sub>2</sub>e/ person</u> in 2030, 30% lower than the 2020 and 58% lower Than the 2030 target.

